INCREASING COMPETITIVENESS THROUGH STRENGHTENING REGIONAL INDUSTRIAL CLUSTERS: MIDDLE TENNESSEE MARKETING REGION (MTM)

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Middle Tennessee Marketing Region (MTM):

Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Warren, and Wayne Counties

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Executive Summary:

Increasing Competitiveness through Strengthening Regional Economic Clusters in Middle Tennessee Marketing Region (MTM)

Strategically located between Nashville (MSA), TN, and Huntsville (MSA), AL, the Middle Tennessee Marketing Region (MTM), which consists of 14 counties (Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Warren, and Wayne), presents tremendous business opportunities with its diverse economic structure and strong industrial base, according to a study conducted by the Business and Economic Research Center (BERC) at the Jennings A. Jones College of Business at Middle Tennessee State University. The study's findings highlight the necessity of regional level leadership in leveraging existing regional assets to create a cluster-based competitive regional economy through

- regional-level marketing,
- increasing synergies between industries in target clusters and their suppliers and customers,
- strengthening the cluster supply-chain by diversifying target clusters, and
- investing in human resources.

The BERC study was commissioned by Middle Tennessee Industrial Development Association in Nashville. After reviewing the broader socioeconomic dynamics and workforce issues in the MTM region, this study identifies regional industrial clusters and provides a detailed assessment of target industry clusters to present a detailed roadmap for the competitive regional economic development initiatives.

Major highlights from the study:

- The MTM region is strategically located within a one-day driving distance of nearly half of the states in the U.S. Furthermore, there are nearly 2.5 million people living within a 70-mile radius of the region, a market size creating significant opportunities for existing and prospective businesses.
- The MTM region's socioeconomic trends are healthier than those of the U.S. and Tennessee, but its current economic indicators lag behind the nation and the state.
- The MTM region's model-driven underemployment rate suggests that nearly one-fifth of the region's workforce is available for new opportunities.
- The location of the MTM region is seen as a major asset by area businesses.

- Area businesses and secondary data suggest that workforce education requires immediate attention to leverage regional economic potential to the fullest extent possible.
- The MTM region's economy is very diverse compared to the economy of individual counties. At the regional level, counties complement each other. A further diversification of the region's economy through target clusters is likely to make the regional economy more vibrant and resilient to economic downturns.
- The MTM region has strong entrepreneurial activities, as the region has a relatively large share of small businesses.

Major recommendations of the study:

- Target the following four (4) major clusters and their subclusters to promote inter-industry linkages, strengthen the cluster supply-chain, and address needs of cluster occupations:
    - Motor Vehicle and Associated Products (Motor Vehicle, Rubber Products, and Plastics Products),
    - Advanced Metal Manufacturing (Machine Tools, Nondurable Industry Machinery, and Metalworking and Fabricated Metal products),
    - Information Technology and Precision Instrument Manufacturing (Optical Equipment and Instruments, Computer and Electronic Equipment, and Information Services), and
    - Agribusiness (Breweries and Distilleries and Packaged Goods Products);
- Explore the following emerging/potential clusters and create synergies among the components of these potential clusters across and beyond the region:
    - Aerospace and Defense/ Alternative Energy/ High Tech and
    - Tourism/ Agribusiness;
- Develop a regional-level marketing campaign;
- Provide leadership for a regional-level workforce analysis;
- Conduct an in-depth target cluster needs assessment; and
- Critically assess the issues and concerns raised by small businesses at the regional level;

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We also would like to thank Jimmy Johnston and Bill Shuff of Middle Tennessee Industrial Development Association for spearheading and providing guidance throughout this study.

Finally, we would like to thank local economic development representatives and mayors of 14 counties, as well as local businesses for sparing their times to give us their feedbacks through surveys and interviews throughout this study.

I. INTRODUCTION

I.1. Region in Transition

Rural regions across America have experienced dramatic changes in their economic landscapes. The obvious manifestation of this change is the steady decline of manufacturing sector employment through downsizing, outright plant closing, relocation of companies overseas, and reconsolidation of branch operations. Especially rural regions where the traditional manufacturing sectors dominated the economy have been affected by these shifts disproportionally. Although increasing overseas competition and globalization have been seen as the primary triggers in shifting economic dynamics, technological changes further exacerbated the situation in rural areas where basic infrastructures (i.e., information technology, physical infrastructure, human resources) are not up to challenge to make the transition from the traditional manufacturing to the technology-intensive knowledge economy.

For many rural regions, then, the critical issue is to manage this multifaceted transition in a way that (1) strengthens existing businesses, (2) upgrades workforce skills, (3) addresses small business concerns, and (4) upgrades the aging infrastructure. The ultimate goal is to create employment and wealth in these communities. What should these communities do to ensure success on the path of employment and wealth growth?

By looking at the individual county economies in rural America, one thing is clear: many are too small and sparsely populated to overcome current economic difficulties. Furthermore, many have less diverse economies that are dependent on a few manufacturing plants. On the positive side, however, rural economies have a larger share of small and medium-size companies that are considered the seed of innovation and entrepreneurship.

To overcome the difficulties a single rural county faces, two principles have been advanced in economic development literature: (1) the regional approach to economic development and (2) the industrial cluster approach at the regional level. The regional approach requires an economic development strategy at a level that includes a group of counties rather than individual counties. Defined as concentration of industries connected through backward and forward as well as horizontal linkages, such as a common technology and labor pool, the industry cluster approach is seen as a primary force in securing and maintaining a region's competitive advantage. Particularly, the diamond model of Porter (1990) promotes

clustering of successful industries, and once industry clusters are formed, they show a tendency to generate a significant ripple effect throughout the region.[1]

Why are regional industrial clusters important? When an industry cluster is identified and promoted at the regional level, it is more likely to promote regional economic competitiveness, resulting in high-paying jobs and wealth. A significant level of investment has been made in this area by the U.S. Economic Development Administration across the United States (www.eda.gov). The cornerstone of this approach is that sound economic development should be based on the existing businesses of the region, by (1) addressing issues the existing businesses are facing, (2) strengthening the supply chain of core businesses through creating synergies among suppliers, customers, and related industries, (3) identifying and upgrading the skill needs of the workforce employed by the existing businesses, and (4) establishing synergies between the businesses and research and training institutions.

Furthermore, while overseas competition and globalization are causing significant job losses in rural regions, increasing transportation costs due to high fuel costs and just-in-time delivery requirements in certain manufacturing companies create a countertrend such that consolidating the supply chain at the regional level and pursuing import substitution policies can spur innovation, employment, and wealth growth.

Realizing these trends and issues in rural Tennessee counties, Middle Tennessee Industrial Development Association (MTIDA) asked the Business and Economic Research Center (BERC) at the Jennings A. Jones College of Business at the Middle Tennessee State University to perform a comprehensive regional economic analysis to identify target industrial clusters. In this study, the area of focus is called the Middle Tennessee Marketing (MTM) region, which consists of the following 14 counties: Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Warren and Wayne.

I.2. Goals

This study aims to address several issues at the regional level to provide a comprehensive roadmap for local and state leaders. Broadly speaking, this study has four major goals:

1. understanding and analyzing regional socioeconomic dynamics;

[1] For a detailed treatment of the issue, see Michael E. Porter, *The Competitive Advantage of Nations,* New York: Free Press (1990). For subsequent studies and application of the theoretical framework by Porter, see *Cluster of Innovation: Regional Foundations of U.S. Competitiveness,* Council on Competitiveness, and "The Economic Performance of Regions," *Regional Studies*, 37 (6&7) (2003).

2. identifying regional industrial clusters;
3. identifying and analyzing target industries; and
4. developing an actionable roadmap for policymakers at the regional and state level.

I.3. Research Questions

In understanding and analyzing regional socioeconomic dynamics and target industrial clusters, we seek answers to the following major questions throughout this study:

1. What are the socioeconomic trends in the region?
2. What is the available workforce in the region?
3. How diverse is the region's economy?
4. What are the major strengths and weaknesses of the region?
5. How does the region meet business needs?
6. What are the prevalent business attitudes in the region?
7. What are the primary reasons for the manufacturing employment loss in Tennessee?
8. What are the regional industrial clusters?
9. How are the target clusters identified?
10. What are the target clusters?
11. What needs to be done for a successful cluster development strategy?

I.4. Organization of the Rest of the Paper

The rest of the paper is organized as follows:

Chapter II provides a general conceptual framework, methods of inquiry, and data. *Chapter III* primarily focuses on "understanding and analyzing socioeconomic dynamics" in the region. This chapter has five major sub-sections that deal with (1) socioeconomic dynamics from a comparative perspective, (2) detailed regional dynamics, (3) workforce availability, (4) regional economic vulnerability, and (5) a general assessment of plant closing in Tennessee.

Chapter IV identifies and analyzes regional industrial clusters in the Middle Tennessee Marketing (MTM) region. After a brief literature review and conceptual framework, this chapter introduces data from an input-output model, analyzes stakeholder interview and survey results, and finally provides regional industrial clusters aligned with national cluster templates identified by Feser (2005).

Chapters V and VI presents the procedures that are used to identify target industrial clusters for the region. After presenting performance-based cluster rankings, these chapters introduce a detailed view of target industrial clusters at the regional level.

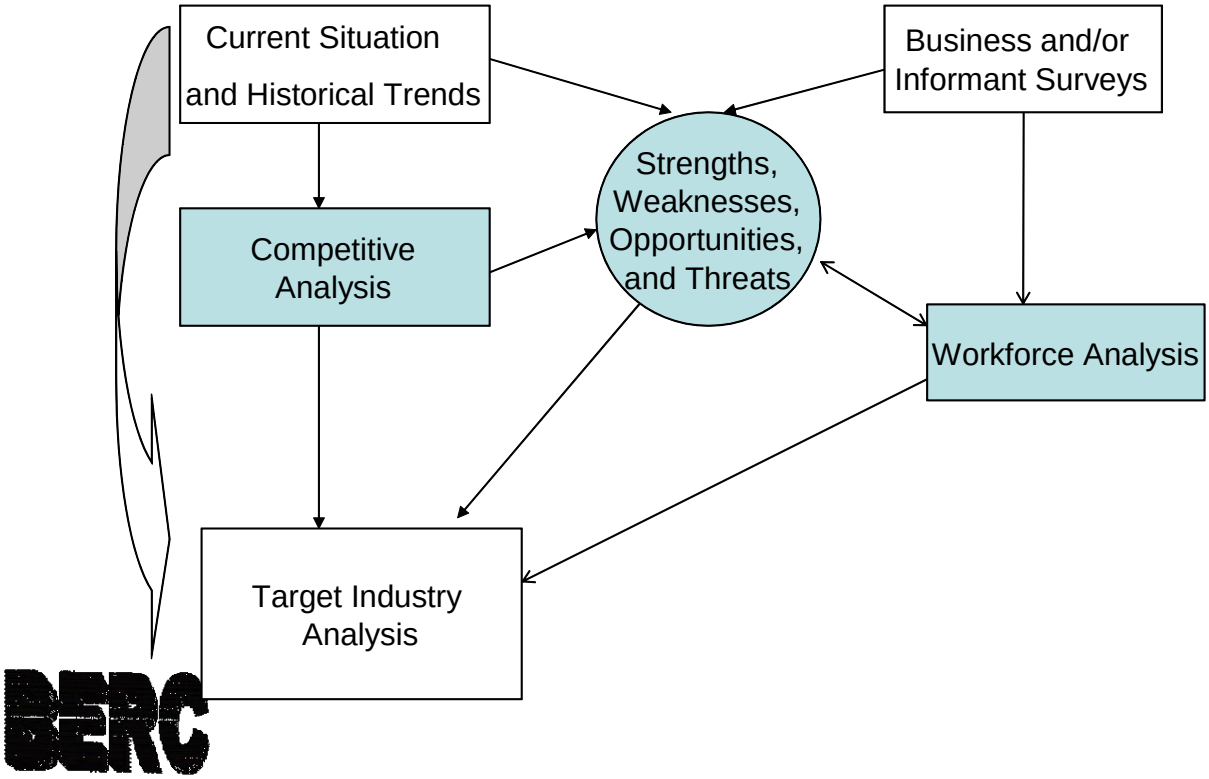
Chapter VII concludes the study with policy recommendations. *Chapters VIII and IX* present data sources and appendices that include major study presentations, respectively.

II. CONCEPTUAL FRAMEWORK, METHODS, AND DATA

II.1. Conceptual Framework

As discussed in the previous chapter, the major goals of this project are to understand and analyze socioeconomic dynamics and identify and analyze target industrial clusters in the Middle Tennessee Marketing (MTM) region. A strategic industry-targeting analysis requires several interconnected levels of analysis, each critical in determining the type of industries suitable for the region. The conceptual framework is presented in Figure II.1. Arrows in Figure II.1 indicate the direction of interaction between the different phases of the project.

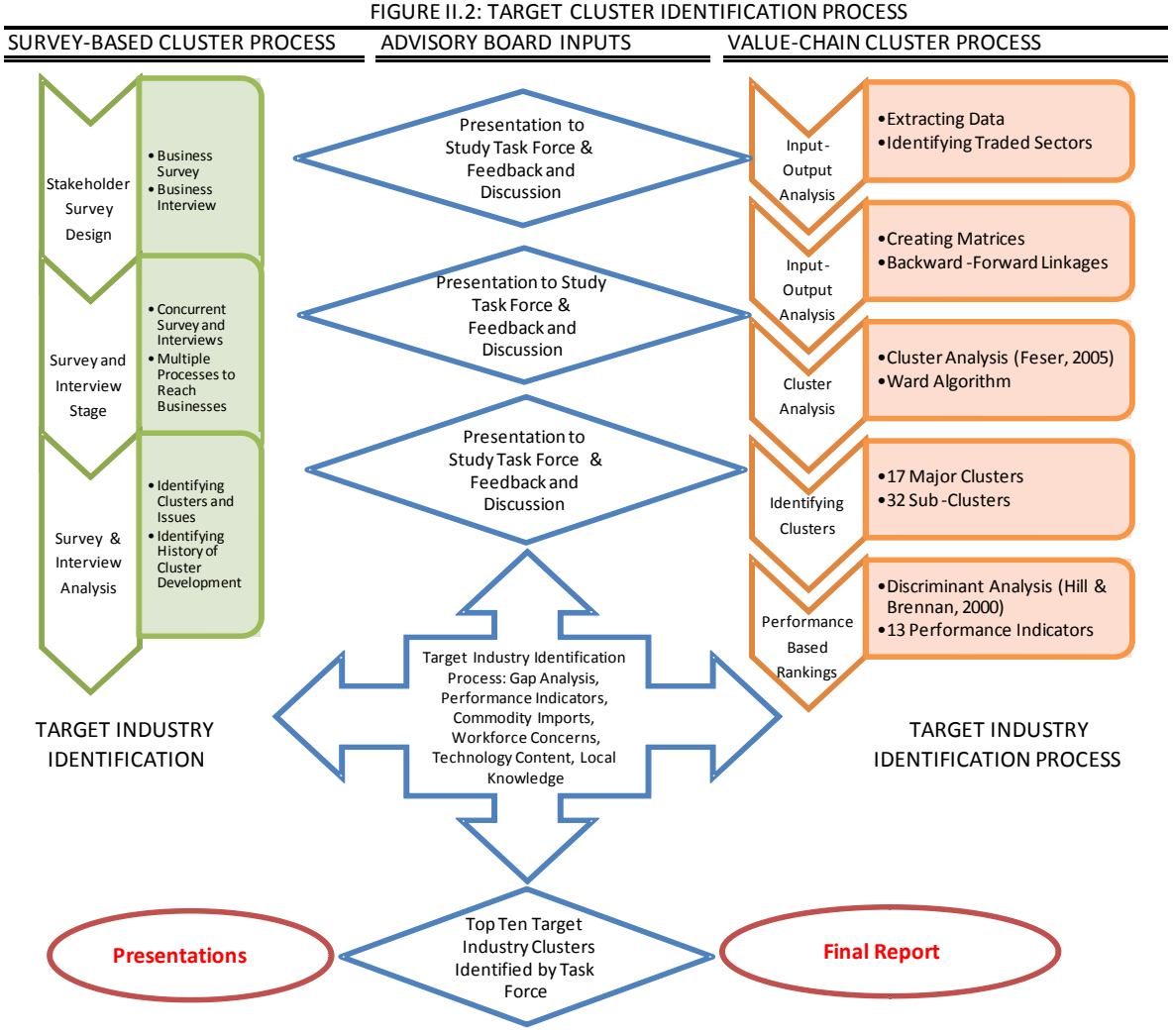
Figure II.1: Conceptual Framework



II.2. Methods of Inquiry

The methods to achieve the stated goals vary by objective but are comprehensive enough to cover a wide range of issues in the strategic economic development literature. The success of any strategic economic development plan, however, depends on leadership, public and private partnerships, and stakeholder participation in the process. The process of analyzing socioeconomic dynamics and identifying and analyzing regional industrial clusters took nearly one year, involving both secondary data analysis and extensive interviews and surveys. Figure II.2 shows the process and methods of inquiry throughout.

FIGURE II.2: TARGET CLUSTER IDENTIFICATION PROCESS



As the Figure II.2 indicates, this study employs a hybrid method of analysis involving surveys, interviews, and secondary data analysis, as well as extensive feedback from the study advisory board member. In terms of surveys and interviews, the study author conducted an extensive review of existing studies in developing questionnaires aimed at answering the specific cluster-related questions.

II.2.a. Survey and Interview Questions

Business surveys and interviews address the following topics, consistent with Porter's (1990) and Feser's (2001, 2005) methodologies of industry cluster analyses:

- Demand Conditions:
    - What are the customer industries?
    - Where are your customer industries located?
    - What are the local, regional, and global trends that create threats and opportunities for your industry through your customer industries?
    - What are the regional strengths and weaknesses for your industry in meeting the demands of your customer industries?
- Supply Conditions:
    - What are the supplier industries?
    - Where are your suppliers located?
    - What are the local, regional, and global trends that create threats and opportunities for your industry through your suppliers?
    - What are the local weaknesses and strengths for your supplier industries?
- Related Industries:
    - Are there similar industries located in the region?
    - What are the common links between your business and the similar industries?
        - Share the same technology
        - Share the same labor pool

    - Have common suppliers
- Are there regional networking opportunities with the similar businesses?
- What are the common problems your business and similar industries are facing?
    - Labor
    - Capital

- Supporting Institutions:
    - What are the critical supporting institutions for your business in the region?
    - Are the existing institutions able to meet your business's demands?
    - If you were asked to pick one supporting institution, what would be your preference? (education, training, R&D, development agency, federal labs, business consulting, financial institutions, etc.)
- Factor Conditions:
    - Which of the following factors are critically important for your business: land, transportation, availability of capital, broadband access, skilled workforce, local and state government support, local development agencies, etc.?
    - How do you rate the current conditions of these factors in the region?
- Other Topics and Issues:
    - As you may know, regional industries/clusters are often characterized by the stage of development they are in. How would you identify your industry: existing, declining, emerging, or potential?
        - Why?
    - Do you characterize your business as a part of a local industry cluster (referring to the study region) or nonlocal industry cluster (may be Nashville MSA or statewide)
    - Which of the following best describes your business's linkages to other similar industries in the region?

  - Member of a value-chain cluster (same extended product chain)
  - Member of a cluster that shares the same labor pool
  - Member of an innovation cluster
- Is there a gap between your firm's use of technology and your industry's technology standards?
  - If yes, why?
- What are the strategic business interactions you would like to see in the region?
- What is the single most important regional factor that impedes a healthy business environment?
- What is the single most important regional asset that improves the business climate in the region?

II.2.b. Cluster Analysis

A target industry analysis comprises two distinct stages. The first involves a comprehensive cluster analysis, which is highly quantitative. The BERC utilizes several existing methodologies as well as a matching workforce analysis. The pioneering work in this area has been done by Porter (1990), Feser and Bergman (2000), Hill and Brennan (2000), and Feser (2005). The second stage involves a qualitative approach, which involves extensive business and key informant interviews and surveys to gain critical insights into cluster structure.

II.3. Data

Data for this analysis come from a variety of sources. The prominent sources of secondary data analysis are the Bureau of Economic Analysis (www.bea.gov), the Bureau of Labor Statistics (www.bls.gov), the Census Bureau (www.census.gov), Woods & Poole, and IMPLANpro (www.implan.com). In addition, we also consulted several other data sources such as www.youreconomy.org, IRS County to County Migration Data, and the Tennessee Department of Labor and Workforce Development (ES202). These secondary data sources are complemented by extensive interviews and surveys of regional business leaders, local economic development officials, and mayors.

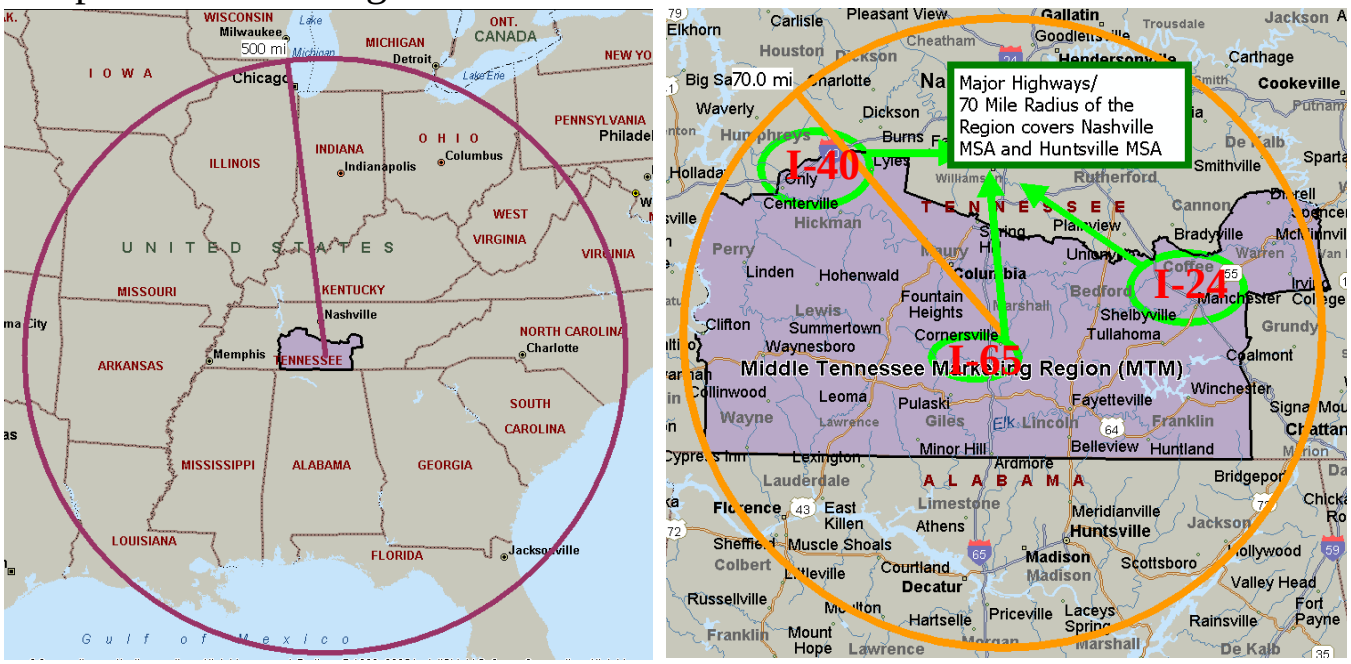
III. UNDERSTANDING AND ANALYZING REGIONAL SOCIOECONOMIC DYNAMICS

III.1. Regional Overview

The Middle Tennessee Marketing (MTM) region is strategically located between the Nashville MSA and the Huntsville MSA. The MTM region includes the following 14 counties: Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Warren and Wayne. As shown in Map III.1 below, nearly 22 states are within a one-day driving distance from the center of the MTM region, located in Marshall County.

Furthermore, three (3) major interstate highways cut across the region, of which the I-65 corridor connects the Nashville and Huntsville MSAs and the I-24 corridor connects the Nashville and Chattanooga MSAs. In the north, the MTM region has access to I-40. The MTM region has significant market potential, as nearly 2.5 million people live within a 70-mile radius or one-hour drive from the center of the region.

Map III.1: MTM Region and Its Market Area



The MTM region itself is sizable with a population of nearly 500,000, of which 220,000 are employed. The MTM region represents somewhere between five (5) and eight (8) percent of Tennessee's major socioeconomic indicators (see Table III.1 below).

Table III.1: Region At A Glance (2006)

	Middle Tennessee Marketing Region	
Indicators	MTM Region	% of Tennessee
Population	452,448	7.49%
Employment	221,847	6.12%
Number of Industries	304	63.07%
Households	178,328	7.23%
Total Personal Income	$11,336,690,000	5.81%
Output	$31,770,393,000	6.52%
Value-Added	$12,568,282,000	5.15%
Per Capita Indicators	MTM Region	As % of United States
Income per capita	$25,056	69.07%
Productivity	$143,209	101.00%
Gross regional product per capita	$27,778	63.03%
Average wage	$28,853	67.17%

Data Source: IMPLANpro, www.census.gov & BERC estimates

According to Table III.1, the MTM region's personal income is more than $11.3 billion, and the value of total goods and services produced in the MTM region is nearly $32 billion. In terms of industrial diversity, more than 63 percent of all Tennessee industries are represented in the MTM region.

Compared to the U.S. average, the MTM region lags behind in terms of income per capita, gross regional product per capita, and average wage. As highlighted in the lower part of Table III.1, the MTM region's income per capita of $25,056 represents about 69 percent of U.S. income per capita. Similarly, the MTM region's average wage of $28,853 represents 67 percent of the U.S. average wage. However, in terms of productivity, defined as output per worker, the MTM region outperforming the U.S. with $143,209 in 2006.

While the MTM region has a sizable market area, its 14 counties have diverse economic and demographic structures. One aspect of this diversity is presented in Map III.2 below. Apart from Hickman County, in the Nashville MSA, the MTM region represents three sets of counties in terms of their rurality: Coffee and Maury counties represent the urban end of the continuum, whereas Perry, Wayne and Moore counties represent the rural end. All others are in between.

Although this study looks at economic dynamics at the regional level, we should pay keen attention to the fact that knowledge of the characteristics of the individual counties is likely to be critically important in designing economic development strategies. Obviously, the county characteristics in the region suggest that "one-size-fits-all" economic development strategies may not benefit all counties in the MTM region.

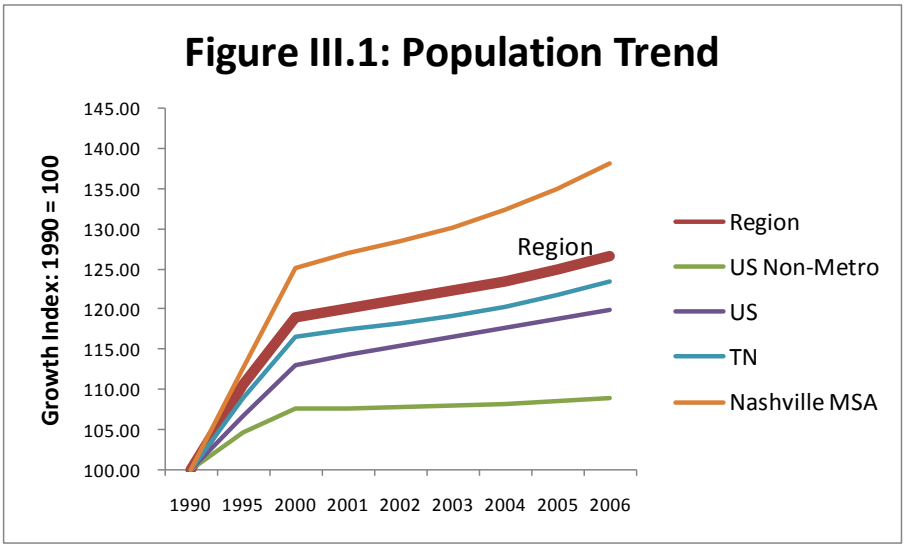
Map III.2: Rural-Urban Continuum

Source: USDA/ERS & BERC Estimates

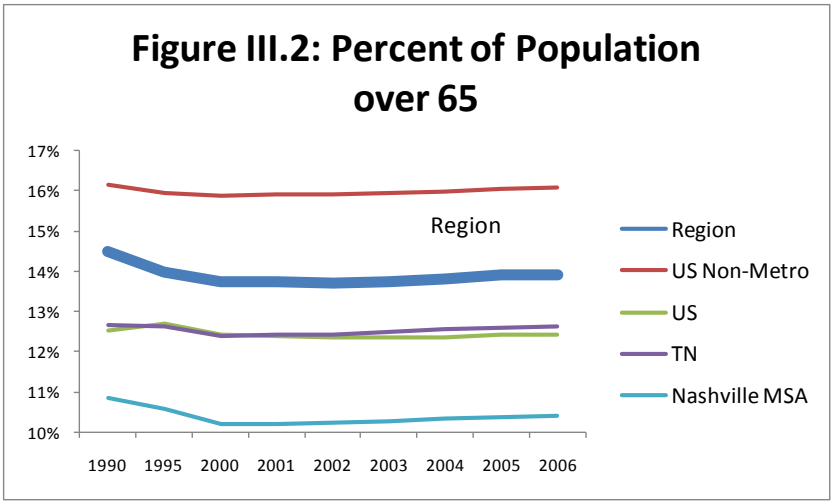
III.2. SOCIOECONOMIC DYNAMICS FROM A COMPARATIVE PERSPECTIVE

III.2.a. Population

Compared to U.S. Non-Metro areas, the U.S., and Tennessee, the MTM region's population growth is relatively healthier over time (Figure III.1).

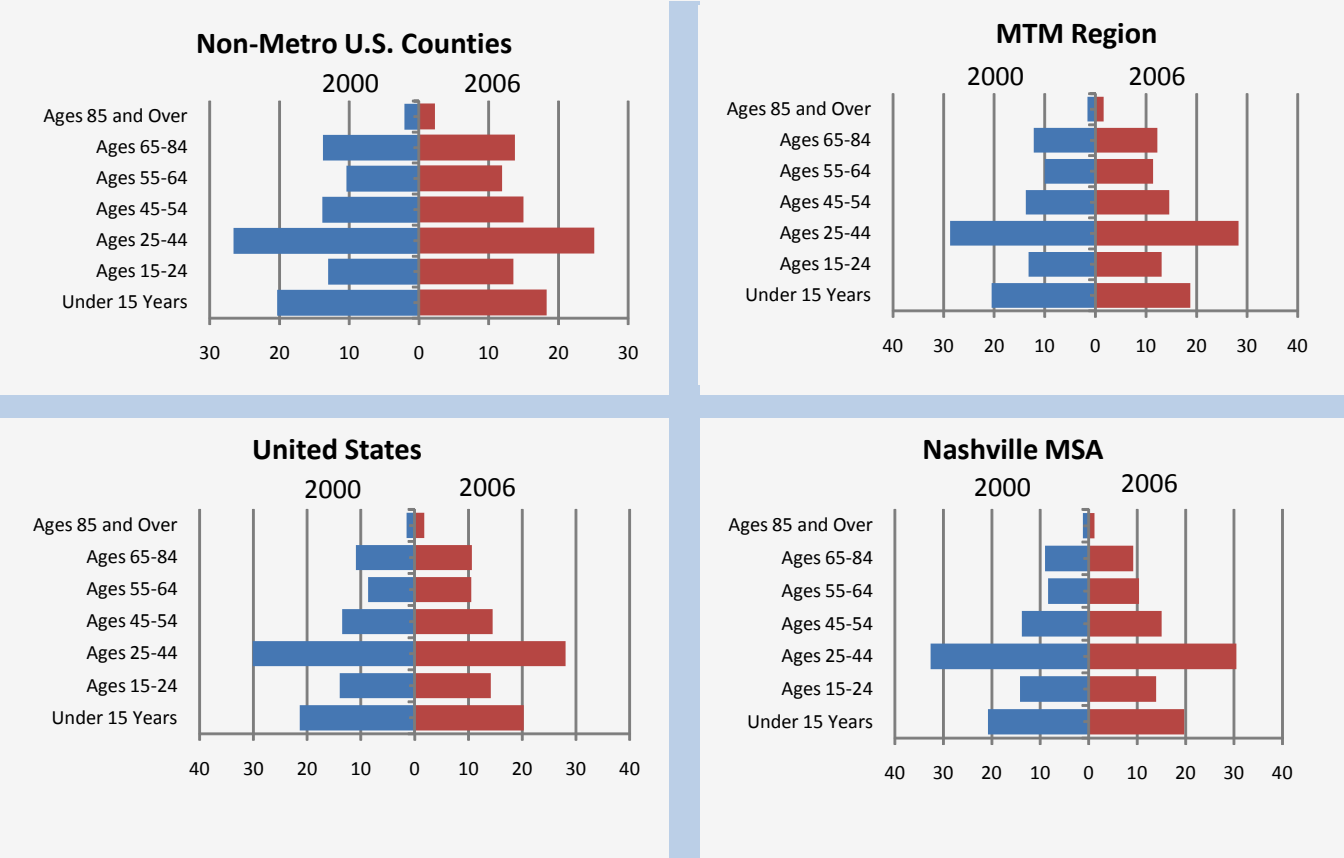


However, the percent of population over age 65 is relatively higher than in the U.S., Tennessee, and the Nashville MSA but lower than U.S. Non-Metro areas (Figure III.2).



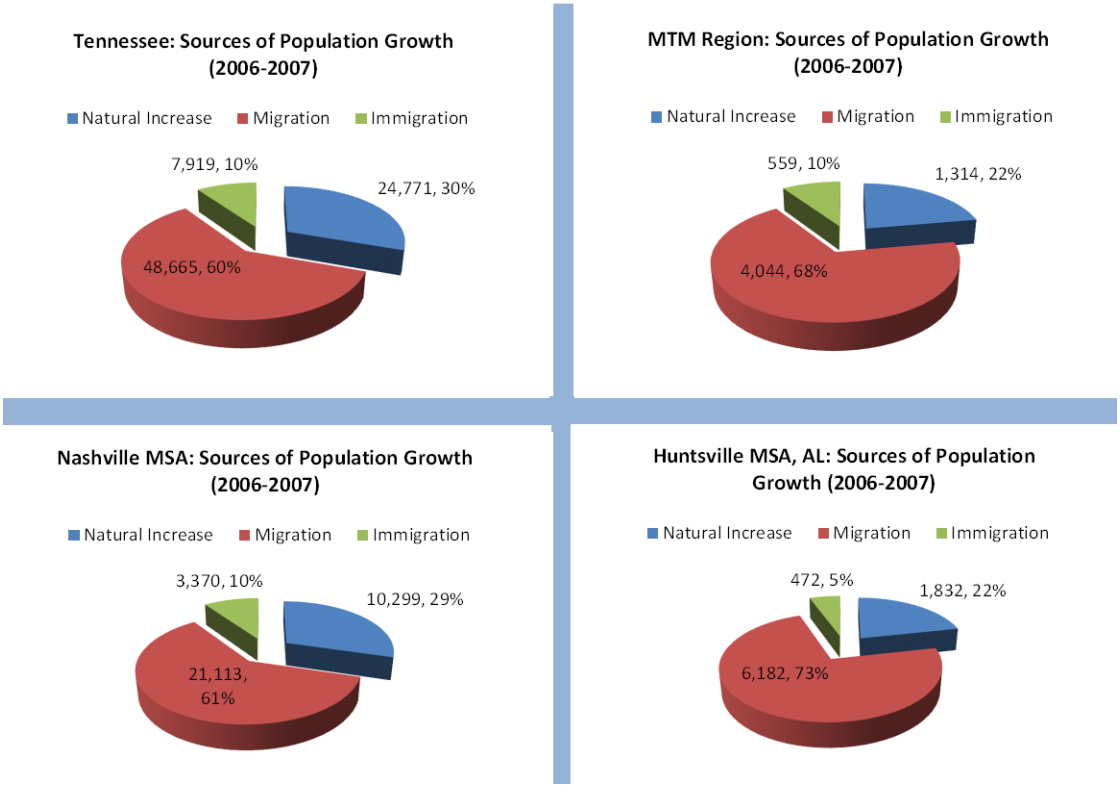
The population pyramids below further shed light on the population dynamics from a comparative perspective. As can be seen in Figure III.3, rural counties and the MTM region have a relatively higher percent of aging population.

Figure III.3: Population Dynamics (2000 vs. 2006)



When we look at the sources of population growth, the MTM region's population growth is primarily driven by migration. In terms of the sources of population growth, th MTM region shows similarities to the Huntsville MSA (Figure III.4).

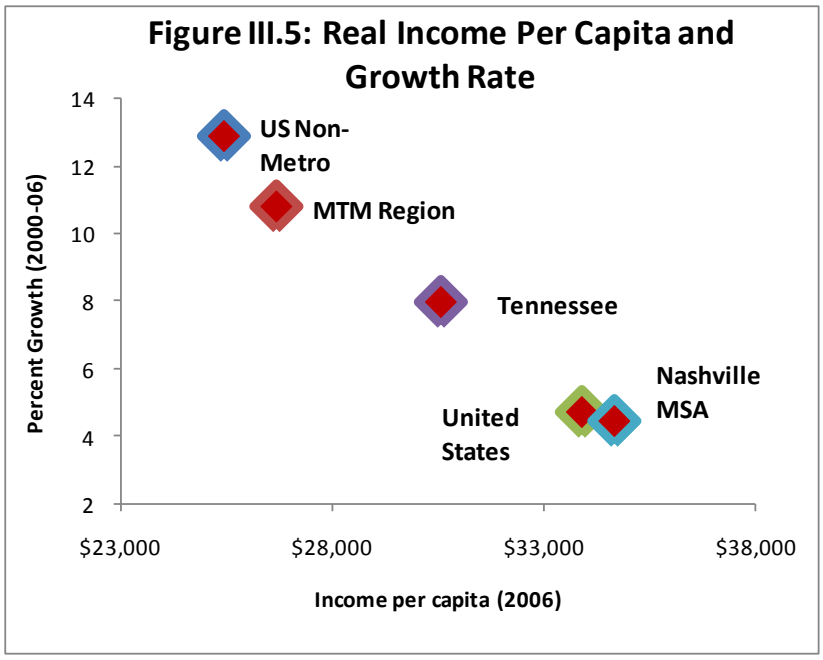
Figure III.4: Sources of Population Growth



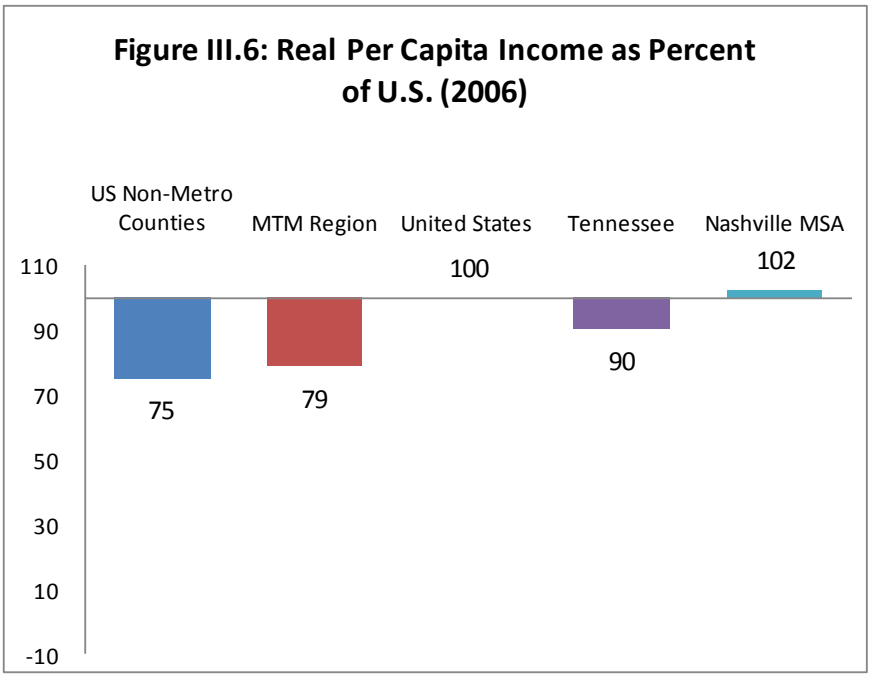
III.2.b. Per Capita Income

Over the years, real income per capita in the MTM region increased more than 10 percent (2000-2006). This increase is significantly higher than the increases in Tennessee, the Nashville MSA, and the U.S. However, compared to other rural counties, increase in real per capita income in the MTM region is slightly lower.

While this is a positive trend for the region, in terms of level of real income per capita, the MTM region lags behind Tennessee, the United States, and the Nashville MSA (Figure III.5).

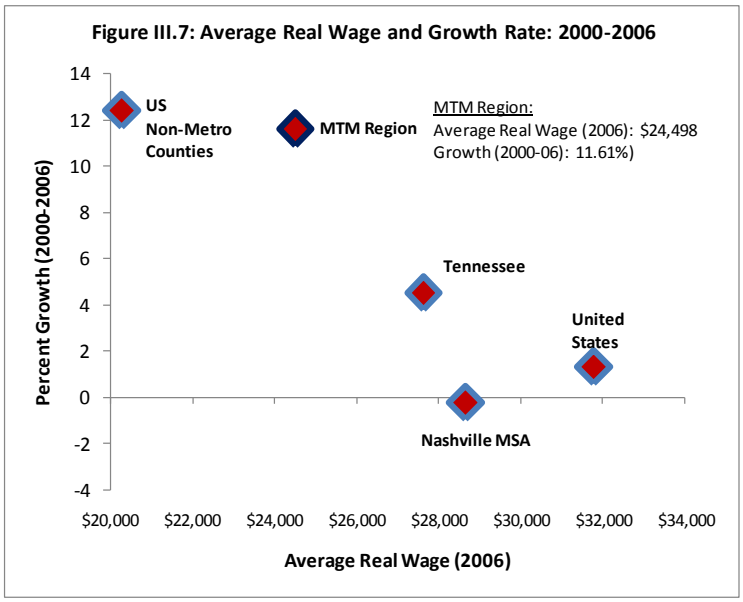


From a comparative perspective, real income per capita in the MTM region is 21 percent lower than the U.S. average (Figure III.6).

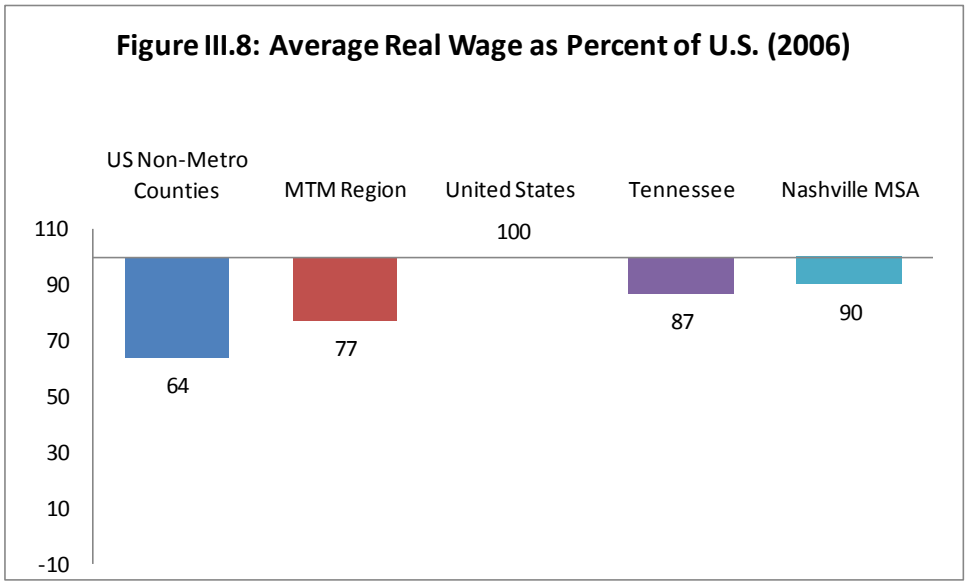


III.2.c. Average Wage

Similar to real income per capita, average real wage in the MTM region increased nearly 12 percent between 2000 and 2006. Compared to Tennessee, the Nashville MSA, and the U.S., this increase is quite significant. However, in terms of average real wage in 2006, the MTM region lags behind the Nashville MSA, Tennessee, and the U.S. but is higher than the U.S. Non-Metro Counties (Figure III.7).



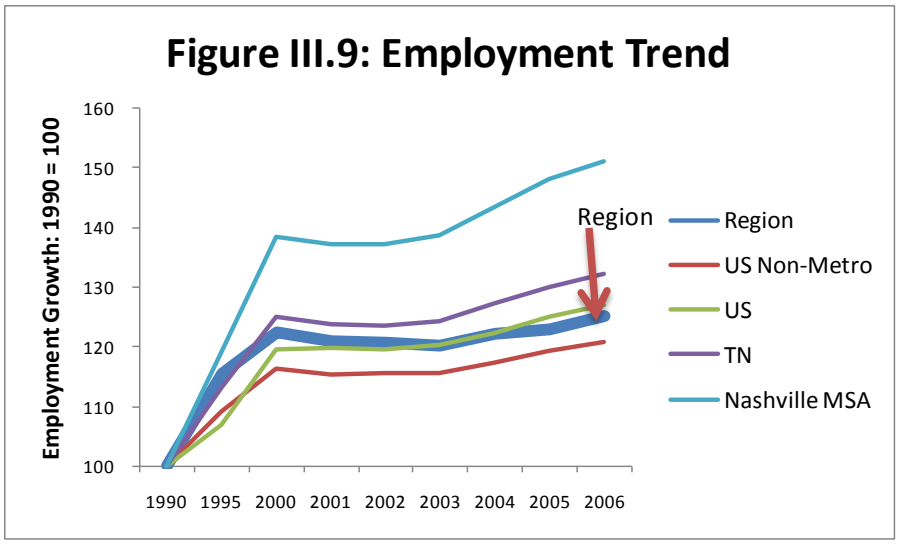
The MTM region's average real income of $24,498 in 2006 is 23 percent lower than the U.S. average (Figure III.8).



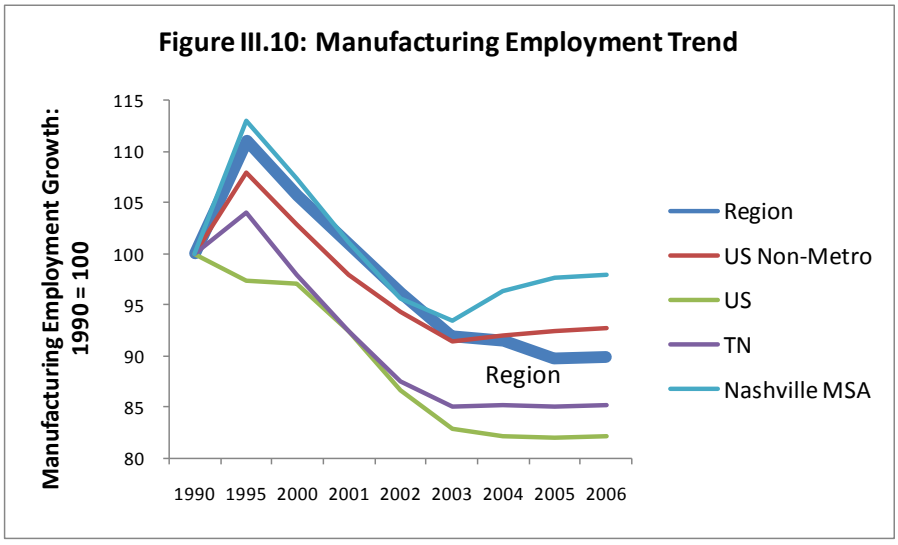
III.3.DETAILED REGIONAL DYNAMICS

III.3.a. Employment Trend

The MTM region's employment growth is closer to the U.S. average but significantly lags behind the Nashville MSA and Tennessee (Figure III. 9).



Although total employment shows an upward trend, the manufacturing sector continues to shed jobs in the MTM region (Figure III.10).



III.3.b. Sectoral Employment

According to the latest available data (2007 Q1), the manufacturing sector dominates the economic landscape in the MTM region with more than 26 percent (Table III.2).

Table III.2: Employment by Major Industry Groupings (2007 Q1): Middle Tennessee Marketing Region (MTM)

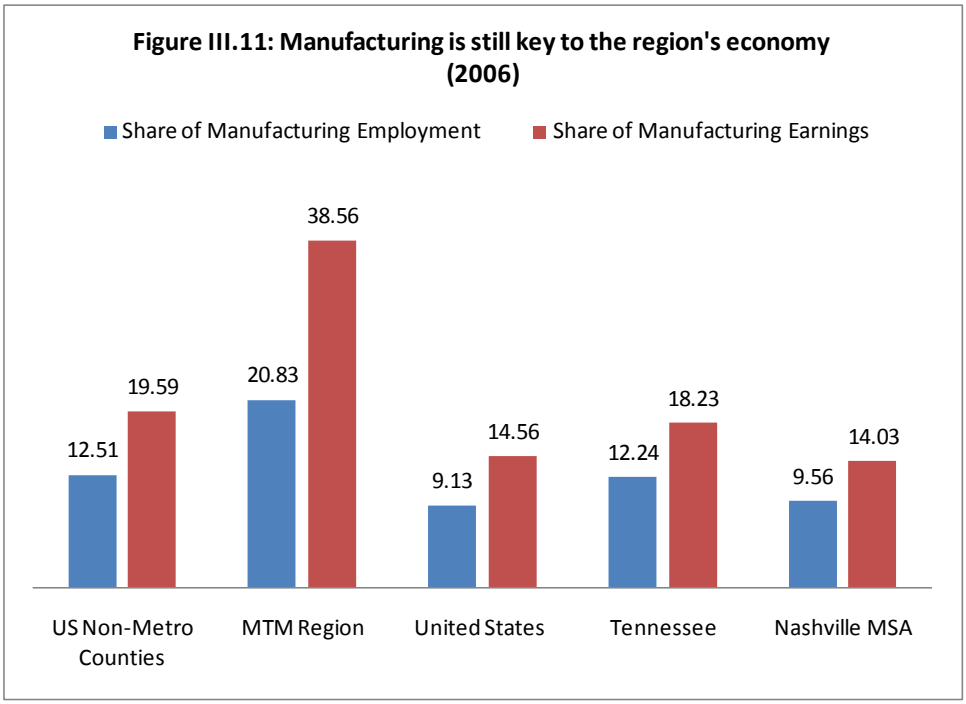
	Employment	Share (%)
Agriculture, Mining, Construction and Utilities	9,479	5.98
Manufacturing	**41,342**	**26.09**
Wholesale and Retail Trade	23,603	14.90
Transportation and Warehousing	4,916	3.10
Enabling Industries*	23,579	14.88
Education and Health Services	**34,760**	**21.94**
Amusement, Hospitality and Other services	14,911	9.41
Grand Total**	158,450	

BERC and ES202 Data
*Includes sectors from business to information services
**Public Administration is excluded.

Despite the continuing trend in job losses in the manufacturing sector (Figure III.10 above), in terms of both share of manufacturing employment in total employment and share of manufacturing earnings in total earnings, the manufacturing sector is still key to the MTM region's economy (Figure III.11 below). Among the reference regions, manufacturing sector employment in the MTM region is the highest with nearly 21 percent in 2006. In terms of earning share, the manufacturing sector accounts for 40 cents of every dollar of sectoral earnings in the MTM region.

"We cannot afford to lose our manufacturing capabilities."

A Local Economic Development Official



III.3.c. Migration

In 2005-2006, a total of 2,438 households changed residency from one county to another in the MTM region. In the same time frame, 6,735 households moved out of the MTM region, while 7,980 households moved into the MTM region (Map III.2 below).

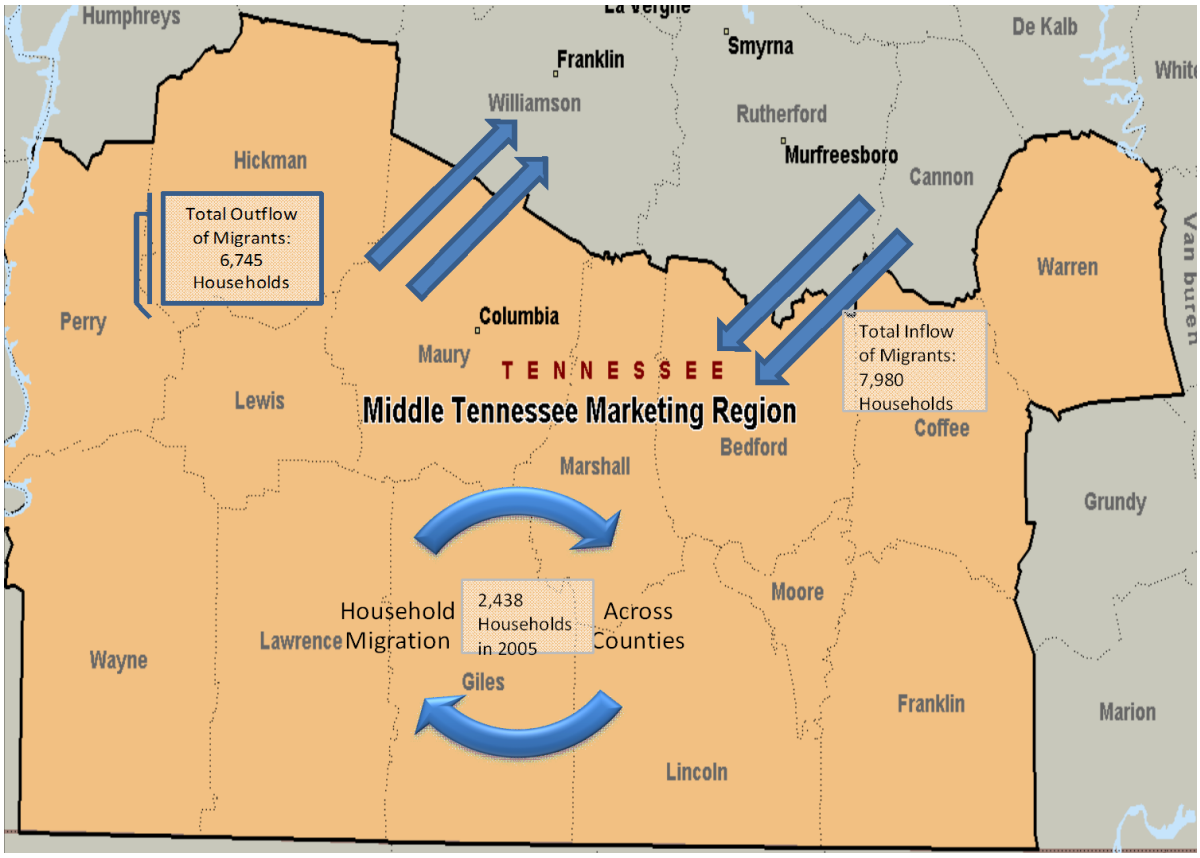
As Table III.3 indicates, net migration (defined as Inflows-Outflows) to the region was 1,235 households. Maury County was the recipient of nearly 50 percent of new households to the MTM region.

Table III.3:

Net Migration (Inflows-Outflows)

Geography	Number of Households
Region	1235
Counties	
Bedford	191
Coffee	222
Franklin	63
Giles	18
Hickman	10
Lawrence	-73
Lewis	39
Lincoln	80
Marshall	122
Maury	551
Moore	-8
Perry	0
Warren	14
Wayne	6

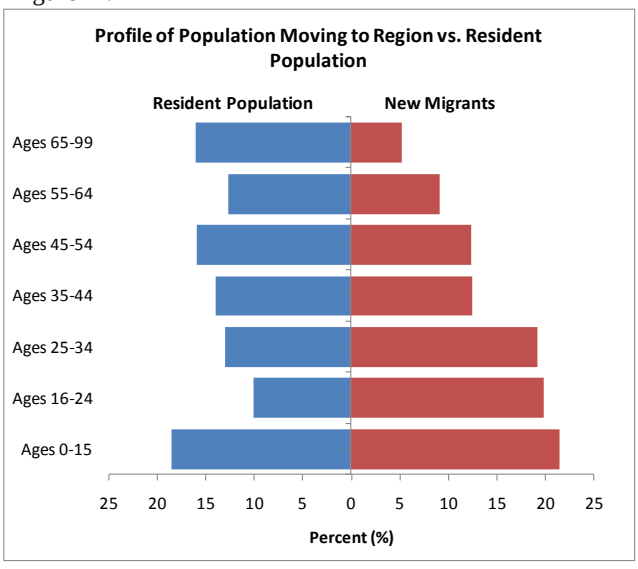
Map III.2: County to County Migration



Source: IRS County-to-County Migration & BERC Estimates

In terms of the characteristics of newcomers to the region, new migrants are relatively young compared to the resident population (Figure III.12).

Figure III.12



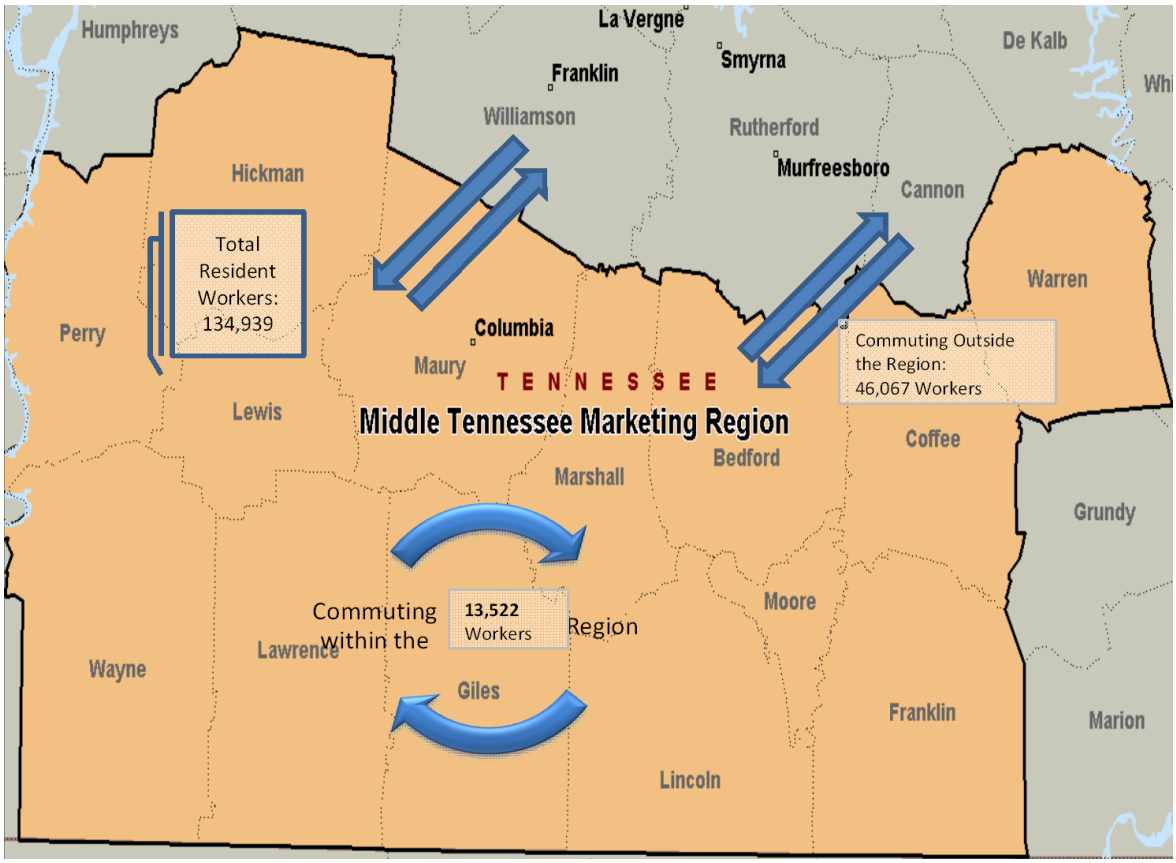
III.3.d. Commuters

Using data from American Community Survey (2006), this study looks at the mobility of workers in the MTM region. Nearly one-third of workers in the MTM region are commuters, of which about seven (7) percent commute from one county to another in the MTM region while 24 percent commute outside the region (Table III.4 & Map III.3).

Table III.4:

One-Third of Workers are Commuters (2006)		
Type of Workers	Number	Percent
Resident Workers	134,939	69.37
Commuting within the region	13,522	6.95
Commuting outside the region	46,067	23.68
Total	194,528	100

Map III.4: Commuters



Source: American Community Survey (%5 PUMS) & BERC Estimates

III.3.e. Workforce by Occupation and Age Cohort

Aging workforce is one of the critical issues nationwide as baby boomers are approaching retirement age. Workforce demand and supply in any given region will be affected by the aging workforce. Even though this study does not critically assess workforce supply and demand in the MTM region, we nevertheless highlight the importance of this issue, as it has implications for workforce development initiatives within the industrial cluster framework.

As Table III.5 below demonstrates, retirement-age workers (ages 65-99) represent a significant share of employment in certain occupations. Many of the occupations having a high percent of retirement-age (ages 65-99) and near-retirement-age (ages 55-64) workers require a certain level of skill beyond a high-school education. This suggests that the demand for skilled labor is likely to increase in the near future simply because of the age composition of the workforce in the MTM region.

To give a few examples, nearly 18 percent of workers in the scientists and technicians occupational category are within the 65-99 age cohort, while that number for legal services occupations is 12 percent, entertainment 27 percent, and protective service workers 19 percent.

When we combine the percent of workers in the near-retirement age (ages 55-64) and retirement age (ages 65-99) cohorts, nearly one in every two workers in the following occupations is in one of these two age cohorts: legal services occupations, scientists and technicians and entertainment.

Other major occupational categories that exhibit a similar pattern to a lesser extent are managerial positions, education, protective service workers, cleaning services, sales, and office workers. In this group of occupational categories, on average one in every four (4) workers is in the near-retirement or retirement-age cohort.

Table III.5:

Employment by Occupation and Age Cohorts (%) (Region-2006)

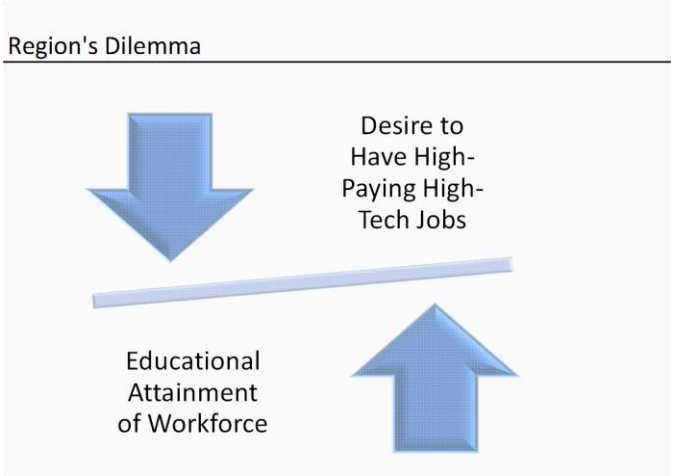
	Between 16 and 24	Between 25 and 34	Between 35 and 44	Between 45 and 54	Between 55 and 64	Between 65 and 99
Managerial Positions	4.49	17.21	27.57	28.02	**17.44**	**5.27**
Business Services Positions	5.79	20.36	27.06	29.59	**17.19**	**0.00**
Financial Services Positions	12.22	12.18	33.33	24.48	14.38	**3.41**
Computer Programmers and Database Administrators	0.00	19.31	46.04	15.44	**19.22**	**0.00**
Engineering	7.44	28.47	17.99	27.58	12.42	**6.10**
Scientists and Technicians	0.00	12.18	9.89	28.94	**31.04**	**17.95**
Community Services	5.94	17.11	42.39	17.79	11.20	**5.57**
Legal Services Occupations	0.00	17.77	27.55	4.39	**38.42**	**11.87**
Education	8.54	17.82	24.16	25.67	**17.89**	**5.92**
Entertainment	5.34	11.46	25.97	16.02	14.13	**27.09**
Medical	5.53	25.19	31.40	25.25	11.59	**1.03**
Health Services	24.68	20.15	19.83	24.56	8.24	**2.54**
Protective Service Workers	13.53	18.73	12.00	24.26	12.22	**19.24**
Eating and Drinking	48.97	19.91	9.50	10.42	8.63	**2.56**
Cleaning Services	15.50	14.46	24.06	18.51	**18.63**	**8.83**
Personal Services	16.54	20.32	25.02	18.23	11.45	**8.44**
Sales	19.88	20.35	14.37	19.83	**19.02**	**6.56**
Office Workers	14.27	22.47	18.32	20.72	16.19	**8.03**
Farming, Fishing and Forestry	32.24	17.57	20.85	8.33	**21.01**	**0.00**
Construction	16.53	32.35	19.19	20.24	10.96	**0.73**
Extraction (Drilling)	0.00	92.75	0.00	0.00	0.00	**7.25**
Maintenance and Repair	11.20	19.27	18.30	33.07	**14.79**	**3.37**
Production Workers	9.31	24.96	19.61	23.56	**17.10**	**5.47**
Transportation	13.37	19.05	27.46	20.57	12.13	**7.41**

Source: American Community Survey & BERC Estimates

III.3.f. Workforce Education

At the heart of any regional economic initiative is the issue of availability and quality of workforce. This is especially true more than ever before due to major economic shifts the rural regions are experiencing. This section primarily deals with the state of workforce education in the MTM region, while the next section will treat workforce availability.

In the course of our engagement in the MTM region for this study, the following statement resonated across counties: "We would like to bring high-paying high-tech jobs to the region." Although this is an extremely desirable goal for rural communities where income and wages are falling behind the national average in the midst of an increasing cost of living, the reality is that many of these communities are significantly lagging behind national averages in workforce education.



This dilemma is very much visible in the MTM region, as the desire to have high-paying high-tech jobs is counteracted by the educational realities of workforce. Of course, a less desirable option is to recruit workers with these qualities from other regions.

How is the MTM region doing in terms of workforce education? As Table III.6 clearly demonstrates, there is a large gap between the MTM region and Tennessee, on one hand, and between the MTM region and the U.S., on the other, in terms of postsecondary education categories.

Table III.6:
Educational Attainment: Then and Now (25 years and over)

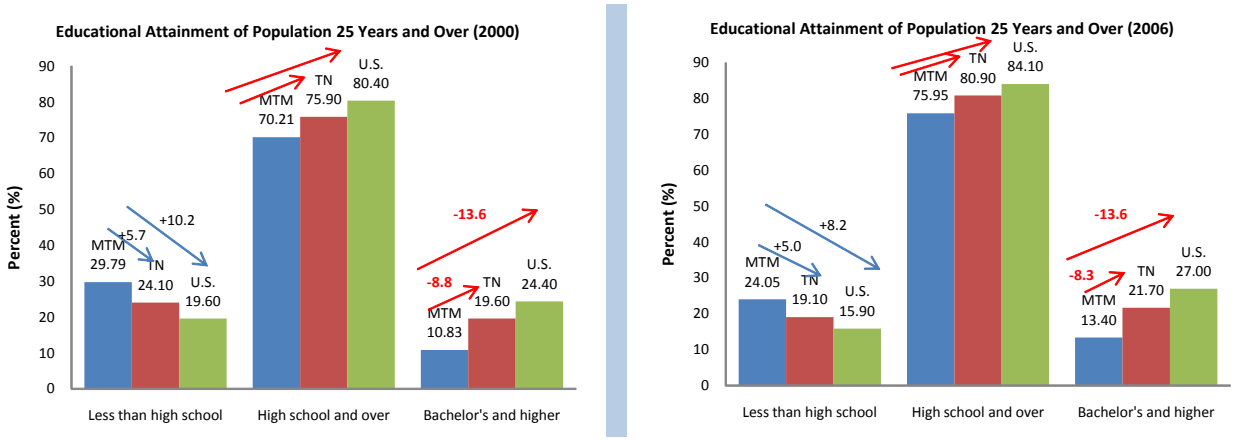
	2000			2006		
Educational Attainment	MTM	TN	U.S.	MTM	TN	U.S.
Less than high school	29.79	24.10	19.60	24.05	19.10	15.90
High school graduate (includes equivalency)	38.21	31.60	28.63	40.68	34.40	30.20
Some college, no degree	16.94	20.00	21.05	16.31	19.20	19.50
Associate degree	4.23	4.70	6.32	5.56	5.70	7.40
Bachelor's degree	6.78	12.80	15.54	8.62	14.10	17.10
Graduate or professional degree	4.04	6.80	8.86	4.78	7.50	9.90
Summary View						
Less than high school	29.79	24.10	19.60	24.05	19.10	15.90
High school and over	70.21	75.90	80.40	75.95	80.90	84.10
Bachelor's and higher	10.83	19.60	24.40	13.40	21.70	27.00

Source: Tabulated from Census 2000 and American Community Survey
MTM refers to Middle Tennessee Marketing Region

Although the MTM region made some improvements between 2000 and 2006 in the areas of bachelor's and higher educational categories, it is still significantly behind the U.S. average and Tennessee. For example, the percent of people over age 25 with a bachelor's degree or higher increased 2.75 percentage points between 2000 and 2006. However, the MTM region lags behind the U.S. 13.60 percentage points

in 2006 in the same educational attainment level. The following figure (III.13) further elaborates on these differences across time and educational attainment levels. One observation from the figure is that compared to the U.S., the MTM region has a significant surplus in less than high school educational attainment and a substantial and stable deficit in bachelor's and higher educational attainment.

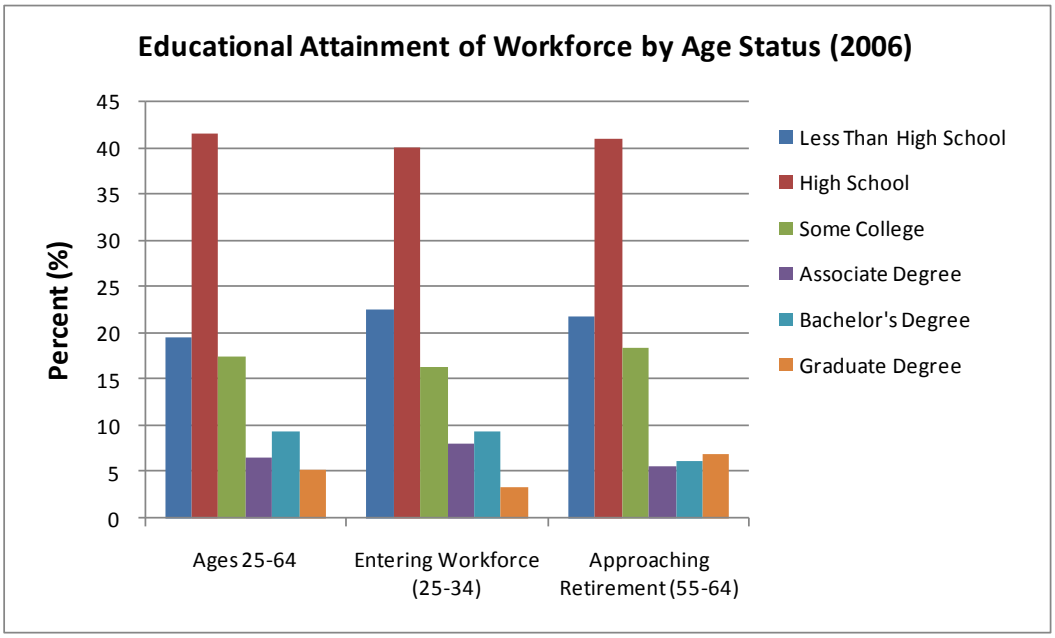
Figure III.13: Gaps in Educational Attainment (2000-2006)



Source: American Community Survey, Census Bureau & BERC Estimates

While the gap in postsecondary educational attainment categories is significant compared to both Tennessee and the U.S. average, is there an intergenerational difference in educational attainment levels in the MTM region? Figure III.14 below looks at the educational attainment level by age cohort.

Figure III.14: Educational Attainment by Age Cohort



Source: American Community Survey & BERC Estimates

According to Figure III.14, there is not much change between entering workforce (ages 25-34) and those approaching retirement age (ages 55-64) in the less than high school educational attainment category. The workforce approaching retirement age is relatively better off in the high school, some college, and graduate degree categories. The entering workforce is slightly better in associate and bachelor's degree categories.

A critical observation about this figure is that there is no significant change in the "less than high school" category. An analysis of occupational employment by educational attainment shows that the ***"less than high school" category as an educational requirement for occupations is no longer part of the official job description for nearly all occupations in the U.S.*** (www.bls.gov). In order to address employment and wage issues effectively, there should be policies that aim at eliminating the education gap in the region.

What is the extent of the educational gap in the MTM region? Table III.7 below provides a detailed look at employment by occupation and educational attainment in the MTM region. This table also compares the percent of the MTM region's workforce having a college degree or above in each occupational category with that

of the U.S. workforce. The large percentage point gap indicates that if properly addressed, the MTM region has the potential to make significant gains in wages and income by eliminating existing educational gaps in occupational employment.

For example, only 33 percent of scientists and technicians in the MTM region have a college degree or above as opposed to 79 percent in the U.S. This translates into a gap of 46 percentage points, suggesting there is significant room for educational improvement in this occupation. Similarly, the college and above degree gap in legal services occupations is more than 25 percentage points, in medical occupations 24 percentage points, in sales 25 percentage points, and in computer programmer and database administrators 19 percentage points.

Eliminating higher education attainment gaps even in these selected occupations is likely to boost economic dynamics in the MTM region. A synchronized approach to workforce education and cluster strategy is necessary for a successful regional economic development initiative.

Table III.7: Educational Attainment by Occupation (%) (2006)

Occupations	Middle Tennessee Marketing Region					U.S. Average	Region-U.S
	Less Than High School	High School	Some College	Associate Degree	College and Above	College and Above	GAP in College & Above
Managerial Positions	6.07	34.48	19.99	2.89	36.58	60.00	-23.42
Business Services Positions	0.00	29.48	19.04	16.84	34.64	51.00	-16.36
Financial Services Positions	2.27	15.20	24.76	12.46	45.32	63.00	-17.68
Computer Programmers and Database Administrators	0.00	22.21	15.26	15.08	47.45	66.00	-18.55
Engineering	1.12	14.45	29.52	8.02	46.89	60.00	-13.11
Scientists and Technicians	0.00	41.76	17.49	7.51	33.24	79.00	-45.76
Community Services	12.42	5.64	6.41	7.86	67.67	69.00	-1.33
Legal Services Occupations	0.00	27.63	16.33	16.33	39.71	65.00	-25.29
Education	4.72	18.64	10.19	5.94	60.52	77.00	-16.48
Entertainment	3.64	25.44	13.93	13.98	43.01	54.00	-10.99
Medical	0.00	10.52	14.74	40.77	33.97	58.00	-24.03
Health Services	20.32	35.34	36.14	4.26	3.94	15.00	-11.06
Protective Service Workers	7.02	53.69	22.84	3.49	12.95	23.00	-10.05
Eating and Drinking	39.33	42.69	14.24	2.68	1.06	9.00	-7.94
Cleaning Services	37.90	46.02	10.10	0.00	5.98	8.00	-2.02
Personal Services	20.05	42.31	26.55	7.06	4.03	21.00	-16.97
Sales	16.77	42.43	24.02	4.52	12.26	37.00	-24.74
Office Workers	6.87	39.78	31.75	12.43	9.18	18.00	-8.82
Farming, Fishing and Forestry	59.00	22.62	18.38	0.00	0.00	7.00	-7.00
Construction	31.33	56.82	9.03	0.99	1.82	4.00	-2.18
Extraction (Drilling)	51.21	48.79	0.00	0.00	0.00	3.00	-3.00
Maintenance and Repair	16.57	50.80	23.10	6.77	2.76	9.00	-6.24
Production Workers	23.68	54.98	15.21	2.50	3.63	7.00	-3.37
Transportation	30.88	55.16	11.55	1.18	1.22	12.00	-10.78

Source: American Community Survey, BLS, & BERC Estimates

III.4. WORKFORCE AVAILABILITY:

LABOR FORCE, UNEMPLOYMENT, AND UNDEREMPLOYMENT

III.4.a. Overview

How many people are available in the MTM region to work if an existing or prospective company decides to hire additional people? How can we estimate workforce availability in the MTM region? These are some of the critical questions that need to be addressed when dealing with business expansion and recruitment. The traditional answer to these questions is to cite the unemployment rate, defined as the percent of the labor force that is looking for jobs but unable to find one. However, in many rural regions, the unemployment rate reflects less than half of the story: in addition to unemployment, a significant number of people are employed but underutilized due to economic reasons, skill mismatch, and other reasons. Furthermore, there are discouraged workers and retirees who are willing to reenter the labor force. The number of people falling under these three categories is sometimes three times larger than the officially defined unemployment rate. We label this group "underemployed."

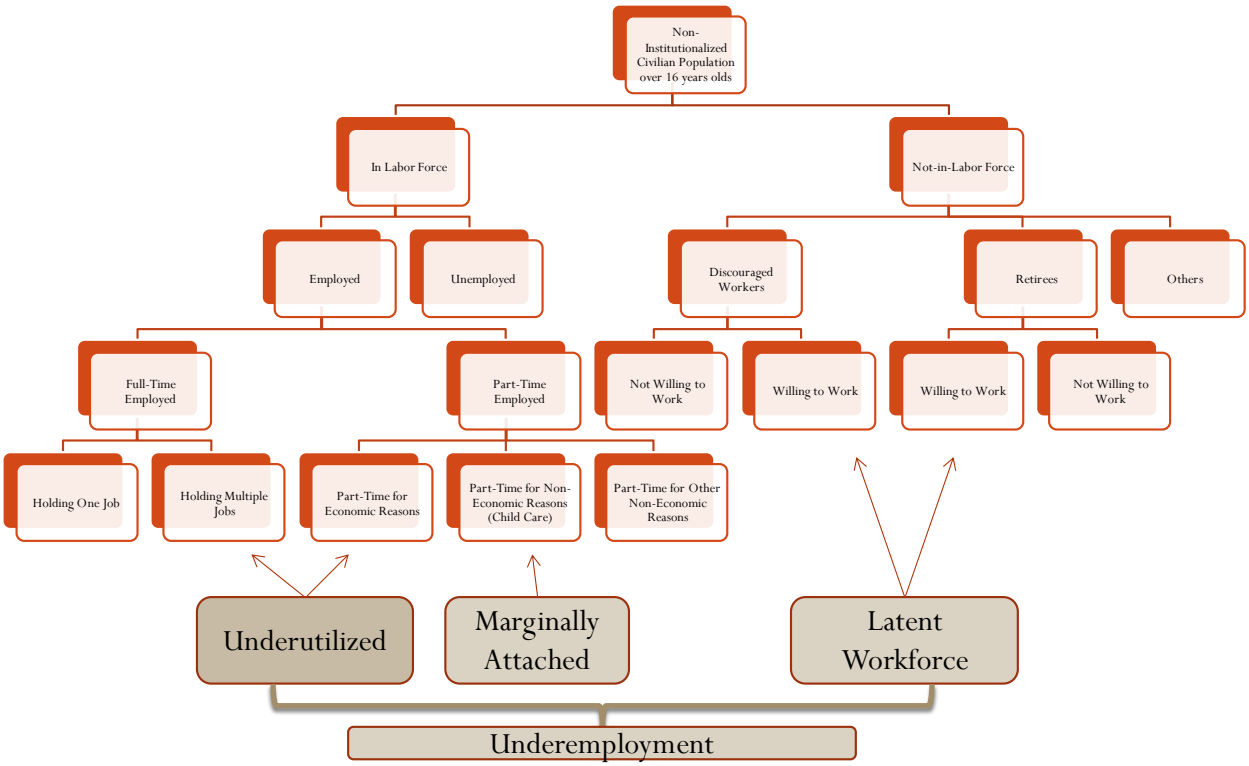
Although knowing the total available workforce and their characteristics in a region is critically important for local economic development specialists, estimating it poses a real challenge. In the absence of readily available data, a survey-based underemployment estimate with periodic updates is necessary to capture the extent of workforce availability. Realizing the importance of underemployment estimates for attracting new businesses to their regions and addressing workforce related-issues, many regions and states initiated underemployment surveys. A prominent example of such initiatives is the Alabama underemployment survey conducted in 2005.

Underemployment surveys provide a good understanding of the available workforce but are costly. Given the cost and time constraints, the Business and Economic Research Center performed a secondary data analysis to impute the underemployment rate in the MTM region and provide a conservative estimate of the available workforce. However, these estimates should not be used as a substitute for comprehensive survey based estimates.

In the section that follows, we provide a conceptual framework and model-driven estimates of underemployment in the MTM region and each of its 14 counties.

III.4.b. Conceptual Framework

Based on the review of empirical works and survey-based underemployment studies, we define underemployment as the sum of underutilized, marginally attached, and latent workforce. Further, underutilized workers constitute those who are holding multiple jobs and working part-time for economic reasons. Marginally attached workers are those who work part-time for noneconomic reasons, such as child care. while latent workers include those who are discouraged workers but willing to work and retirees who are willing to reenter the labor force. The following chart details the scope of underemployment and its relationship with other components of the civilian population over age 16.



We must acknowledge the fact that this definition of underemployment left out a significant number of people who are employed full-time and holding one job but willing to consider new opportunities due to long commuting hours, low wages, skill-mismatch, and other reasons. The only way to capture this group is through underemployment surveys.

III.4.c. Methodology

State level underemployment rates are estimated from the Current Population Survey (October 2007) for 50 states and the District of Columbia. In addition, the BERC collected a set of socioeconomic indicators for each state that may be used as determinants of underemployment. Selection of these indicators was informed by the survey-based studies conducted in the U.S. to identify the characteristics of the underemployed. At the state level, the BERC then used a subset of available data that may be considered proxies to the individual-level characteristics.

The BERC used Ordinary Least Square (OLS) regression analysis to identify the determinants of state-level underemployment rates. In the simplest form, we specified the following model

$$U_s = \alpha + \beta_i Z_s + \varepsilon$$

where U_s = *underemployment rate at state level,* α = *intercept,* β_i = *vector of regression coefficients,* Z_s = *vector of state level socioeconomic indicator, and* ε = *error term.*

The BERC then used the coefficients from this regression analysis (α, β, and ε) to impute county-level underemployment estimates in the study area.

$$U_c = \alpha + \beta_i Z_c + \varepsilon$$

where U_c = *underemployment rate at county level (to be estimated),* α = *intercept from state regression model above,* β_i = *vector of regression coefficients from state model,* Z_c = *vector of county level indicators corresponding to state level indicators presented above, and* ε = *error term from state model above.*

As mentioned previously, the results obtained through this method provide a conservative estimate of the underemployment in the region. A comprehensive survey is necessary to understand the extent of underemployment in the region.

III.4.d. State-Level Regression Results

Table III.8 presents state-level regression results. Inclusion of the variables in this model is primarily based on the survey of a limited number of available studies and economic reasoning.

Table III.8: State Level Determinants of Underemployment: Regression Results

Dependent Variable: Underemployment Rate (%) (October 2007)				
Variables	Parameter Estimate	Standard Error	t Value	Pr >|t|
Intercept	-8.508	69.042	-0.120	0.903
Population ages 15-24 (%)	0.548	0.640	0.860	0.398
Population ages 25-44 (%)	0.579	0.397	1.460	0.154
Population ages 45-64 (%)	0.138	0.408	0.340	0.737
Whites (%)	-0.011	0.049	-0.230	0.823
Blacks (%)	-0.023	0.077	-0.300	0.769
Hispanics (%)	-0.011	0.066	-0.170	0.869
Female (%)	-0.800	1.139	-0.700	0.487
Farm, Agricultural, and Mining (Employment, %)	0.296	0.302	0.980	0.335
Construction (Employment, %)	-0.150	0.656	-0.230	0.821
Manufacturing (Employment, %)	0.309	0.152	2.030	0.051
TCPU (Employment, %)*	0.318	0.429	0.740	0.465
Wholesale (Employment, %)	-0.408	0.561	-0.730	0.473
FIRE (Employment, %)**	-0.373	0.255	-1.460	0.154
Retail (Employment, %)	1.213	0.482	2.510	0.017
Unemployment Rate (%)	-0.586	0.374	-1.570	0.127
Households Income Under $20K (%)	0.211	0.179	1.180	0.248
Wage (Average)	0.000	0.000	2.880	0.007
HSNHS/COL*** (Ratio)	-0.490	0.844	-0.580	0.566

R-Square: 0.471

Data Source: Underemployment Rate is calculated from Current Population Survey for 50 States and District of Columbia. All Other Variables are from Census, BLS, BEA, and Woods and Poole 2007.

*Transportation, Communications and Public Utilities.

**Finance, Insurance and Real Estate

***Ratio of percent of people over 25 with high school and less than high school education over percent of people with some college and above education.

III.4.e. County Level Findings

The BERC utilized coefficients presented in Table III.8 and county-level indicators in Table III.9 below to impute the underemployment rate at the county level.

Table III.9: County Socioeconomic Indicators Used for Calculating Underemployment Rate (2006)

County Indicators	Bedford	Coffee	Franklin	Giles	Hickman	Lawrence	Lewis	Lincoln	Marshall	Maury	Moore	Perry	Warren	Wayne
Population ages 15-24 (%)	13.03	12.51	15.01	13.47	12.59	13.10	12.85	12.77	12.85	13.23	12.92	13.12	12.06	12.77
Population ages 25-44 (%)	31.22	27.70	25.82	25.97	30.76	27.21	26.83	26.68	29.00	28.59	27.22	24.74	29.30	32.24
Population ages 45-64 (%)	23.56	25.45	26.72	27.73	25.44	24.52	26.80	26.87	26.98	26.71	28.14	27.61	25.39	25.73
Whites (%)	78.51	91.69	91.45	86.67	93.59	96.48	96.51	90.01	88.33	81.40	95.50	95.78	89.02	91.34
Blacks (%)	7.89	3.65	5.62	11.44	4.43	1.59	1.74	7.07	7.53	13.24	3.44	2.86	3.18	7.23
Hispanics (%)	12.21	3.43	2.05	1.06	1.33	1.31	1.24	1.85	3.72	4.44	0.74	1.16	6.96	0.91
Female (%)	49.95	51.27	51.11	51.16	47.04	51.35	50.53	51.23	50.59	50.93	49.65	50.33	50.20	44.47
Farm, Agricultural, and Mining (Employment, %)	8.10	5.00	10.00	14.00	13.00	11.00	8.00	15.00	10.00	5.00	20.00	8.00	15.00	15.00
Construction (Employment, %)	7.06	5.94	7.10	5.30	12.76	5.86	8.33	5.94	4.61	4.58	3.13	4.71	4.22	3.04
Manufacturing (Employment, %)	27.07	17.16	12.38	20.77	10.58	17.44	11.49	19.69	36.32	18.01	12.61	36.13	29.11	17.39
TCPU (Employment, %)*	3.48	2.31	3.08	3.01	3.80	4.56	4.65	2.20	5.04	4.11	1.89	2.83	3.89	2.07
Wholesale (Employment, %)	2.15	2.93	2.27	2.71	2.23	4.91	3.56	3.20	1.16	2.62	1.74	1.28	4.39	1.57
FIRE (Employment, %)**	5.42	4.63	5.60	5.18	5.55	4.61	6.64	4.19	4.73	6.17	13.08	4.29	3.74	3.91
Unemployment Rate (%)	5.30	5.55	5.80	7.26	5.47	11.77	7.31	4.23	6.46	5.58	4.74	6.66	9.42	10.92
Households Income Under $20K (%)	21.69	25.00	24.00	24.00	27.00	27.00	27.00	26.00	23.00	20.00	20.00	30.00	31.00	32.00
HSNHS/COL*** (Ratio)	7.99	4.72	5.52	8.48	14.01	10.52	10.81	7.40	8.40	6.34	7.47	13.04	9.95	11.44
Retail (Employment, %)	11.75	18.41	14.96	16.43	9.71	18.07	17.66	14.27	13.13	15.85	9.81	8.75	13.00	11.96
Wage (Average)	$23,531	$25,041	$17,904	$21,110	$15,254	$18,664	$15,943	$17,759	$22,688	$38,413	$19,888	$19,196	$23,233	$17,315
Underemployment Rate (%)****	9.49	13.15	5.42	9.67	0.00	5.34	3.40	7.90	13.67	16.25	0.64	2.58	10.84	9.16

Data Source: All Variables (Except Underemployment Rate) are from Census, BLS, BEA, and Woods and Poole 2007.

*Transportation, Communications and Public Utilities.

**Finance, Insurance and Real Estate

***Ratio of percent of people over 25 with high school and less than high school education over percent of people with some college and above education.

****Underemployment Rate is imputed from the state Ordinary Least Square (OLS) regression coefficients in Table III.8.

Findings suggest that the underemployment rate in the region is nearly 10 percent. This is in addition to a 6.47 percent unemployment rate in the region. A word of caution: these two figures should not be added together, as they are completely different constructs.

As of 2006, there were 13,634 unemployed workers seeking jobs in the region with an additional 20,575 underemployed individuals, so the total available labor pool increases to 34,209 people.

Table III.10 presents the major findings.

Table III.10: Available Labor Pool in Middle Tennessee Marketing Region (MTM): Employment, Unemployment, and Underemployment**

Counties	Labor Force	Employed	Unemployed	Underemployed	Unemployment Rate	Underemployment Rate
Bedford	22,114	20,970	1,144	2,099	5.2	9.49
Coffee	25,478	24,086	1,392	3,349	5.5	13.15
Franklin	20,087	18,942	1,145	1,088	5.7	5.42
Giles	13,471	12,513	958	1,303	7.1	9.67
Hickman	10,415	9,860	555	0	5.3	0.00
Lawrence	16,899	14,990	1,909	902	11.3	5.34
Lewis	5,244	4,869	375	178	7.2	3.40
Lincoln	17,047	16,331	716	1,346	4.2	7.90
Marshall	12,649	11,854	795	1,729	6.3	13.67
Maury	36,422	34,451	1,971	5,920	5.4	16.25
Moore	3,125	2,978	147	20	4.7	0.64
Perry	3,350	3,131	219	86	6.5	2.58
Warren	18,031	16,405	1,626	1,955	9	10.84
Wayne	6,539	5,857	682	599	10.4	9.16
MTM Region	210,871	197,237	13,634	20,575	6.47	9.76

BERC and Current Population Survey. Statewide underemployment calculations are from October 2007

**Imputed from state level indicators using Ordinary Least Square (OLS) regression analysis

***All indicators for counties are for 2006

Table III.11 presents the components of underemployment at the county level in the MTM region.

Table III.11: Components of "Underemployment"* Estimated from Averages of States Using Current Population Survey (October 2007)

	Components of Underemployment					Latent Workforce**	
Counties	FT but part-time for economic reasons	PT and usually PT for economic reasons	Not at work, Usually Part-Time	FT holding multiple jobs	Marginally attached-childcare problems	Discouraged worker and retired -not in the labor force but interested in working	Total "Underemployment"
Bedford	166	305	167	899	73	490	2,099
Coffee	265	486	266	1,434	117	781	3,349
Franklin	86	158	86	466	38	254	1,088
Giles	103	189	104	558	45	304	1,303
Hickman	0	0	0	0	0	0	0
Lawrence	71	131	72	386	31	210	902
Lewis	14	26	14	76	6	42	178
Lincoln	107	195	107	577	47	314	1,346
Marshall	137	251	137	740	60	403	1,729
Maury	469	859	470	2,535	206	1,381	5,920
Moore	2	3	2	9	1	5	20
Perry	7	13	7	37	3	20	86
Warren	155	284	155	837	68	456	1,955
Wayne	47	87	48	256	21	140	599
MTM Region	1,629	2,985	1,635	8,811	717	4,799	20,575

BERC and Current Population Survey (October 2007).

*Underemployment reported here includes five (5) different labor force-related constructs: (1) Part of the civilian labor force but employed part-time for economic reasons (underutilized), (2) part of the civilian labor force but employed part-time due to child care needs (marginally attached), (3) part of the civilian labor force and employed full-time but holds multiple jobs, (4) not in the civilian labor force and not looking for job but interested in working (discouraged workers/latent workforce), and (5) not in the civilian labor force due to retirement but interested in working (latent workforce).

**Concept of latent workforce refers to those individuals who are not in the civilian labor force due to discouragement, retirement, disability, and other reasons but indicated that they consider working full-time or part-time.

Table III.12 provides the total available labor pool based on the imputed underemployment estimates. According to Table III.12, as of 2006, the MTM region had 13,634 unemployed people, 15,776 employed but underutilized, and 4,799 not in the labor force but interested in working. The total available labor pool is estimated at more than 34,000, representing nearly 16 percent of the revised labor force.

Table III.12: Revised Labor Force Data: Total Available Labor Pool

Counties	Labor Force	Latent Workforce*	Revised Labor Force	Unemployed	Employed But Underutilized	Not in Labor Force But Interested in Working	Available Labor Pool	Percent of Revised Labor Force**
Bedford	22,114	490	22,604	1,144	1,610	490	3,243	14.35
Coffee	25,478	781	26,259	1,392	2,568	781	4,741	18.06
Franklin	20,087	254	20,341	1,145	834	254	2,233	10.98
Giles	13,471	304	13,775	958	999	304	2,261	16.41
Hickman	10,415	0	10,415	555	0	0	555	5.33
Lawrence	16,899	210	17,109	1,909	692	210	2,811	16.43
Lewis	5,244	42	5,286	375	137	42	553	10.47
Lincoln	17,047	314	17,361	716	1,032	314	2,062	11.88
Marshall	12,649	403	13,052	795	1,326	403	2,524	19.34
Maury	36,422	1,381	37,803	1,971	4,539	1,381	7,891	20.87
Moore	3,125	5	3,130	147	15	5	167	5.34
Perry	3,350	20	3,370	219	66	20	305	9.06
Warren	18,031	456	18,487	1,626	1,499	456	3,581	19.37
Wayne	6,539	140	6,679	682	459	140	1,281	19.18
MTM Region	210,871	4,799	215,670	13,634	15,776	4,799	34,209	15.86

*Latent labor force includes those individuals who are not in the civilian labor force but interested in working part-time or full-time.

**Available labor pool as percent of revised labor force is imputed from the state level OLS regression. Survey data in neighboring states (Alabama and Kentucky) suggests that these percentages represent the minimum rate of available labor pool.

Including "latent workforce" as defined here increases the labor force from 210,871 to 215,670

III.5. ASSESSING REGIONAL ECONOMIC VULNERABILITY: VITALITY, AUTONOMY, AND ECONOMIC DIVERSITY

III.5.a. Overview

As rural economies are transforming, certain aspects of economic development strategies have gained prominence over the years. Among them, four major concepts stand out very clearly: *regional autonomy, regional vitality, economic diversity, and economic vulnerability*. We will first briefly define these concepts and then look at the performance of the MTM region in these areas.

Regional autonomy refers to the extent of branch operations in the MTM region's economy. The higher the employment and establishment shares of branch operations are, the more dependent the MTM region is on the economic developments occurring outside the MTM region.

Regional vitality refers to the extent of employment and establishment shares of small firms in the MTM region. Relatively higher shares of these firms in a region suggest the presence of high economic vitality.

As a concept, *economic diversity* refers to a healthy mix of sectoral employment/resource base. *Economic (sectoral) vulnerability* is defined as having a regional economic mix concentrated in a few sectors, thereby making the region's economy vulnerable to economic shocks. Considering the massive outflow of manufacturing jobs from primarily rural counties that have a heavy concentration of manufacturing jobs, the concepts of diversity and vulnerability have become an important part of rural economic development strategies.

To measure the economic diversity, many studies utilize a Herfindahl-type index, which measures firm concentrations and competition in a given sector. This study utilizes a measure similar to the Herfindahl-Hirschman Index as well as an extension of it to measure "effective number of sub-sectors."

In the sections that follow, we briefly look at the methodological issues and then provide the extent of regional autonomy, vitality, diversity, and vulnerability in the MTM region from a comparative perspective.

III.5.b. Methodology

Regional autonomy and economic vitality measures are obtained from www.youreconomy.org. The database provided in this website is from the National Establishment Time Series (NETS), a collaboration between Walls and Associates in Oakland, CA, and Dun and Bradstreet (D&B).

Sectoral diversity and vulnerability measures are calculated using 4-digit NAICS level data from Tennessee Department of Labor and Workforce Development ES 2002 data. According to 2007 Q1 ES202 data, there were 316 sub-sectors at this level in Tennessee. The general economic diversity index is created using 316 sub-sectors.

For the county-level detailed diversity analysis, the BERC regrouped employment by sector into seven categories, excluding public administration because of disclosure issues. These seven major employment categories are agriculture, mining, construction, and utilities; manufacturing; wholesale and retail trade; transportation and warehousing; enabling industries; education and health services; and amusement, hospitality, and other services.

What are the methods to measure economic diversity? A review of literature suggests a number of methods with varying statistical characteristics to calculate economic diversity. In this study, the BERC utilized a fractionalization index to estimate the level of economic diversity and effective number of sub-sectors in a region. This index is defined as $D = 1 - \sum S_i^2$,

where *D*=diversity index and *S* is the employment share of sector (i) in a regional economy.

The BERC then used a related measure to estimate "effective number" of sub-sectors in a region based on the level of diversity. This measure is defined as: $e = \frac{1}{1-D}$, where (e) refers to the "effective number of sub-sectors" and (D) is diversity index as defined above. These indexes are from the same family of measures as the Herfindahl-Hirschman Index.[1]

A note on interpreting these two measures: as defined here, lack of diversity in a given regional economy is interpreted as vulnerability. In certain instances, while lacking diversity, a region may have a very strong competitive edge in selected sectors. In this case, although the region may have a few competitive sectors, it is still considered vulnerable to external shocks due to lack of diversity. Many regions attempt to strike a balance between desire for diversity and having a competitive edge in specific areas.

[1] For more information on these indices, see Ordeshook, Peter C., and Olga V. Shvetsova (1994), "Ethnic Heterogeneity, District Magnitude, and the Number of Parties," *American Journal of Political Science* 38: 100-123, and Rae, Douglas (1971), *The Political Consequences of Electoral Laws,* New Haven, CT: Yale University Press.

III.5.c. Major Industry Groupings, Employment Share, and Sectoral Dependency

Sectoral dependency is defined as a sector having more than 20 percent of employment share in a region. As of 2007 Q1, 11 of 14 counties in the MTM region depend on the manufacturing sector. Coffee County has a large presence of enabling industries, which include finance, business, professional, and management services.

Tables III.13 and 14 present number of employment and its share in total county employment by major industry groupings. As shown in Tables III.13 and 14, all counties in the MTM region except Lewis, Moore and Wayne are heavily dependent on the manufacturing sector. For example, in Perry County, one in every two jobs is in the manufacturing sector. In Bedford, Giles, Marshall, Franklin (with the addition of Nissan's Decherd Plant), and Warren, one in every three jobs is in the manufacturing sector. In the overall MTM region (labeled as Study Area), one in every three jobs is in the manufacturing sector.

Except for manufacturing and education and health services, a few counties heavily depend on other major sectors. For example, Lawrence, Lewis, and Moore counties have a strong presence in wholesale and retail trade, while one in every four jobs in Coffee County is in the enabling sector, defined as the sum of industries that include finance, business, professional, and management services.

Table III.13: Employment by Major Industry Groupings and Percent Share (2007 Q1)

County	Agriculture, Mining, Construction and Utilities		Manufacturing		Wholesale and Retail Trade		Transportation and Warehousing	
	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)
Bedford	1,163	6.14	**7,083**	**37.41**	2,156	11.39	1,411	7.45
Coffee	1,262	4.51	**6,773**	**24.19**	3,949	14.10	334	1.19
Franklin*	727	6.37	**2,221**	**19.45**	1,637	14.33	213	1.87
Giles	589	6.55	**2,697**	**30.03**	1,480	16.48	244	2.72
Hickman	405	11.74	**671**	**19.45**	355	10.31	113	3.28
Lawrence	588	5.44	**2,342**	**21.66**	**2,588**	**23.94**	633	5.86
Lewis	224	8.17	246	8.97	**666**	**24.30**	170	6.21
Lincoln	585	6.15	**2,775**	**29.19**	1,621	17.05	185	1.94
Marshall	524	5.49	**3,336**	**35.00**	1,361	14.28	214	2.24
Maury	1,619	4.95	**6,802**	**20.78**	4,590	14.02	1,000	3.05
Moore	86	5.95	226	15.67	**298**	**20.72**		
Perry	81	3.15	**1,345**	**52.54**	161	6.28	46	1.81
Warren	1,425	10.39	**3,998**	**29.15**	2,284	16.65	278	2.03
Wayne	203	4.38	828	17.90	457	9.88	70	1.51
Study Region	9,479	5.98	**41,342**	**26.09**	23,603	14.90	4,916	3.10
Tennessee	174,224	5.61	449,338	14.48	522,798	16.85	195,212	6.29

*A note on Franklin County: the manufacturing employment does not include Nissan's Decherd Plant, which employs about 1,300 people according to MTIDA community profile (www.mtida.org).

Table III.14: Employment by Major Industry Groupings and Percent Share (2007 Q1) (Continued)

County	Enabling Industries		Education and Health Services		Amusement, Hospitality and Other services		Grand Total
	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)	
Bedford	2,860	15.11	2,383	12.59	1,415	7.47	18,934
Coffee	**7,106**	**25.38**	4,920	17.57	2,617	9.35	28,000
Franklin	640	5.60	**4,203**	**36.81**	1,277	11.18	11,419
Giles	1,149	12.79	1,735	19.32	789	8.79	8,981
Hickman	212	6.16	**1,127**	**32.70**	334	9.69	3,448
Lawrence	749	6.93	**2,140**	**19.79**	1,311	12.13	10,811
Lewis	244	8.91	**755**	**27.52**	274	10.00	2,743
Lincoln	808	8.50	**2,386**	**25.10**	850	8.94	9,508
Marshall	1,109	11.63	**1,870**	**19.62**	721	7.57	9,531
Maury	6,142	18.76	**7,555**	**23.08**	3,875	11.84	32,735
Moore	40	2.76	**645**	**44.80**	71	4.93	1,440
Perry	106	4.14	**661**	**25.81**	56	2.17	2,560
Warren	1,685	12.29	2,522	18.38	1,043	7.60	13,718
Wayne	728	15.74	**1,858**	**40.20**	278	6.01	4,623
Study Region	23,579	14.88	**34,760**	**21.94**	14,911	9.41	158,450
Tennessee	577,435	18.61	**654,094**	**21.08**	382,809	12.34	3,103,318

BERC and ES202 Data

Public Administration is excluded.

Compared to Tennessee, manufacturing employment is more than 12 percentage points higher in the MTM region (with the inclusion of Nissan's Decherd Plant in Franklin County). This general observation alone highlights the importance of diversifying the MTM region's economy.

III.5.d. Autonomy and Vitality

When we look at the MTM region overall, the number of branch operations increased, but employment share of branch operations declined. Table III.15 provides averages of establishments and jobs for two time periods: 2004-2006 and 1993-2006. On average, employment per branch operation was 57 jobs between 1993 and 2006: 10 jobs higher than average per branch operation between 2004-2006. In terms of employment share, on average, branch operations accounted for 32 percent of employment between 1993 and 2006 as opposed to 27.4 percent share between 2004 and 2006. Nearly five (5) percentage points difference between long-term and short-term averages suggest that local businesses start playing a more important role in the MTM region's economy. In fact, a glance at the employment share of large local businesses (500+) highlights the employment shift from branch operations to local businesses as well as government and nonprofit sectors.

Table III.15: Regional Economic Vitality and Autonomy

Region				
Establishments	2004-2006 Average		1993-2006 Average	
	Number	Percent (%)	Number	Percent (%)
Government & Nonprofit	2,184	10.9%	1,833	10.3%
Branch Operation	**1,144**	5.7%	**1,049**	5.9%
Local Businesses	16,720	83.4%	14,896	83.8%
By Employment Size				
Start-up (1-9)	14,871	88.9%	13,148	88.3%
Small (10-99)	1,757	10.5%	1,661	11.2%
Medium (100-499)	79	0.5%	76	0.5%
Large (500+)	12	0.1%	9	0.1%

Jobs	2004-2006 Average		1993-2006 Average	
	Number	Percent (%)	Number	Percent (%)
Government & Nonprofit	29,815	15.3%	27,712	14.7%
Branch Operation	**53,285**	27.4%	**60,263**	32.0%
Local Businesses	111,245	57.2%	100,115	53.2%
By Employment Size				
Start-up (1-9)	37,629	33.8%	35,700	35.7%
Small (10-99)	38,966	35.0%	37,028	37.0%
Medium (100-499)	13,895	12.5%	13,450	13.4%
Large (500+)	20,756	18.7%	13,937	13.9%

In terms of economic vitality, small firms play a critical role in the MTM region's economy. For example, on average, two in every five jobs and four in every five firms were either start-up or small companies between 2004 and 2006. The long-term average (1993-2006) indicates a relatively smaller employment share but higher establishment share.

Comparing the MTM region with the selected reference areas shows that in terms of establishment, the MTM region has the largest share of government and nonprofits as well as start-up (employing less than 10 people) firms (Table III.16). Another interesting observation is that employment share of local large establishments (500+) is the highest in the MTM region compared to Tennessee, the U.S., and the Nashville and Huntsville MSAs. In terms of jobs, employment share of start-up firms is the largest in the MTM region compared to the reference areas, suggesting that state and local business incentives addressing the needs of start-up companies are more likely to spur regional economic competitiveness.

Table III.16: Regional Economic Vitality and Autonomy
2004-2006 Averages (Percent)

Establishments	Region	TN	US	Nashville MSA	Huntsville MSA
Government & Nonprofit	10.9%	9.3%	7.5%	7.8%	8.5%
Branch Operation	5.7%	7.7%	5.5%	8.4%	8.4%
Local Businesses	83.4%	83.0%	87.0%	83.8%	83.2%
By Employment Size					
Start-up (1-9)	88.9%	87.0%	87.9%	87.2%	87.0%
Small (10-99)	10.5%	12.3%	11.4%	12.0%	12.3%
Medium (100-499)	0.5%	0.7%	0.7%	0.8%	0.6%
Large (500+)	0.1%	0.1%	0.1%	0.1%	0.1%
Jobs					
Government & Nonprofit	15.3%	14.4%	16.2%	15.5%	27.2%
Branch Operation	27.4%	27.4%	20.9%	26.9%	27.5%
Local Businesses	57.2%	58.2%	62.8%	57.6%	45.3%
By Employment Size					
Start-up (1-9)	33.8%	29.7%	30.8%	29.6%	31.6%
Small (10-99)	35.0%	38.1%	37.9%	38.6%	40.2%
Medium (100-499)	12.5%	16.0%	16.4%	17.5%	15.2%
Large (500+)	18.7%	16.2%	14.8%	14.3%	13.0%

III.5.e. Economic Diversity

Economic diversity has become an important concept in the MTM region as traditional manufacturing companies started fleeing the region one by one in the past decade. Many rural counties whose economy was relying on a single large manufacturing company felt the pinch in their economies when those large companies shut the plant overnight without even giving proper notice to local economic development officials.

It is no surprise that when we interviewed local economic development officials, businesses, and mayors, they clearly indicated their determination to diversify the region's economy.

> ***"We do not want to put all of our eggs in one basket."***
>
> ***Local economic development officials***

In the context of economic diversity, we would like to highlight a few observations on the MTM region: First, the *region overall has a very diverse economy compared*

to its individual counties. This suggests that economies of the MTM region's 14 counties complement each other rather than compete. This feature of the region should create even more incentives for local economic development officials, elected officials, and businesses to pool their resources to improve economic competitiveness in the region. Diversity score ranges from "0" to "1," with "0" representing an economy with a single industry and "1" representing an economy where employment is distributed fairly even across a set of sectors.

Second, *individual counties' diversity varies significantly with Giles County having the highest and Moore County the lowest diversity scores among the 14 counties.* In terms of rankings, Giles County has the 11th diverse economy among 95 counties in Tennessee, while Moore County ranks 92nd (Table III.17).

Third, *compared to the first quarter of 2001, overall economic diversity increased in the MTM region (2001 Q1-2007 Q1).*

In addition to the diversity index, another measure used here is the "effective number of sectors" in an economy. This concept suggests that actual number of sectors in an economy may not show whether those sectors have a strong presence in the region's economy. "Effective number of sectors" measures the number of sectors corresponding to a given economic diversity score. For example, as highlighted in Table III.17, in the first quarter of 2007, there were 316 4-digit sectors in Tennessee with a diversity score of 0.9848. However, the effective number of sectors corresponding to that diversity score was 65.6, suggesting there were nearly 66 equal-sized sectors in Tennessee's economy.

In the MTM region, effective number of sectors was 47.003 with a slight decline from the first quarter of 2001. Compared to Tennessee and its other counties, the MTM region ranks 6th after Tennessee, Williamson County, Hamilton County, Davidson County, and Knox County. This means that combined, the MTM region's economy is nearly as diverse as the economies of Knox and Davidson County.

In terms of individual counties, among the 95 Tennessee counties, Tennessee, and the MTM region, Giles ranks 13th; Warren 23rd; Lawrence 23rd; Coffee 26th; Maury 32nd; Franklin 36th; Marshall 40th; Lewis 47th; Bedford 56th; Lincoln 58th; Hickman 59th; Wayne 89th; Perry 91st; and Moore 94th.

Table III.17: Regional Economic Diversity Based on 4-Digit NAICS (316 Industries): Rank by 2007 Q1 Diversity Index

		Economic Diversity: 2001 Q1		Economic Diversity: 2007 Q1		Change in Economic Diversity	
Rank	County	Index	Number of Major Industries	Index	Number of Major Industries	Index (%)	Major Industry (%)
1	Tennessee	0.9858	70.6111	0.9848	65.6105	-0.11%	-7.08%
2	WILLIAMSON, TN	0.9788	47.1677	0.9821	55.8165	0.34%	18.34%
3	HAMILTON, TN	0.9819	55.3375	0.9807	51.8897	-0.12%	-6.23%
4	DAVIDSON, TN	0.9817	54.7522	0.9806	51.5189	-0.12%	-5.91%
5	KNOX, TN	0.9828	58.1311	0.9795	48.8047	-0.33%	-16.04%
6	**Study Area**	**0.9789**	**47.3911**	**0.9787**	**47.0025**	**-0.02%**	**-0.82%**
7	WILSON, TN	0.9758	41.3632	0.9778	44.9684	0.20%	8.72%
8	SHELBY, TN	0.9781	45.6803	0.9769	43.2589	-0.13%	-5.30%
9	SUMNER, TN	0.9729	36.9216	0.9767	42.8795	0.39%	16.14%
10	RUTHERFORD, TN	0.9762	41.9787	0.9755	40.7777	-0.07%	-2.86%
11	MONTGOMERY, TN	0.9728	36.7975	0.9744	39.0970	0.16%	6.25%
12	LOUDON, TN	0.9725	36.3920	0.9744	39.0437	0.19%	7.29%
13	**GILES, TN**	**0.9676**	**30.8563**	**0.9738**	**38.1968**	**0.64%**	**23.79%**
14	MCMINN, TN	0.9689	32.1946	0.9731	37.1991	0.43%	15.54%
15	BLOUNT, TN	0.9618	26.1455	0.9729	36.8773	1.16%	41.05%
16	CUMBERLAND, TN	0.9753	40.4694	0.9727	36.6950	-0.26%	-9.33%
17	BRADLEY, TN	0.9765	42.6182	0.9720	35.7687	-0.46%	-16.07%
18	GREENE, TN	0.9742	38.7474	0.9717	35.3035	-0.26%	-8.89%
19	HAMBLEN, TN	0.9552	22.3000	0.9701	33.4838	1.57%	50.15%
20	PUTNAM, TN	0.9714	34.9888	0.9699	33.2763	-0.15%	-4.89%
21	TIPTON, TN	0.9269	13.6739	0.9694	32.6920	4.59%	139.08%
22	GIBSON, TN	0.9666	29.9799	0.9689	32.1909	0.24%	7.37%
23	**WARREN, TN**	**0.9613**	**25.8479**	**0.9682**	**31.4696**	**0.72%**	**21.75%**
24	**LAWRENCE, TN**	**0.9601**	**25.0721**	**0.9679**	**31.1511**	**0.81%**	**24.25%**
25	CAMPBELL, TN	0.9700	33.3587	0.9670	30.3260	-0.31%	-9.09%
26	**COFFEE, TN**	**0.9622**	**26.4256**	**0.9669**	**30.2371**	**0.50%**	**14.42%**
27	DYER, TN	0.9580	23.8092	0.9667	30.0461	0.91%	26.19%
28	WASHINGTON, TN	0.9664	29.7498	0.9642	27.9578	-0.22%	-6.02%
29	DICKSON, TN	0.9573	23.4180	0.9642	27.9073	0.72%	19.17%
30	ANDERSON, TN	0.9671	30.4159	0.9639	27.7152	-0.33%	-8.88%
31	MADISON, TN	0.9794	48.5087	0.9633	27.2630	-1.64%	-43.80%
32	**MAURY, TN**	**0.9375**	**15.9988**	**0.9628**	**26.8608**	**2.70%**	**67.89%**
33	CARROLL, TN	0.9663	29.6756	0.9623	26.5041	-0.42%	-10.69%
34	CARTER, TN	0.9646	28.2661	0.9622	26.4517	-0.25%	-6.42%
35	SULLIVAN, TN	0.9686	31.8937	0.9620	26.3490	-0.68%	-17.39%
36	**FRANKLIN, TN**	**0.9494**	**19.7761**	**0.9617**	**26.1404**	**1.30%**	**32.18%**
37	WHITE, TN	0.9567	23.0952	0.9617	26.1359	0.53%	13.17%
38	OBION, TN	0.9180	12.1960	0.9611	25.7228	4.70%	110.91%
39	FENTRESS, TN	0.9535	21.5080	0.9601	25.0782	0.69%	16.60%
40	**MARSHALL, TN**	**0.8744**	**7.9603**	**0.9597**	**24.8327**	**9.76%**	**211.96%**
41	HENDERSON, TN	0.9488	19.5488	0.9594	24.6513	1.12%	26.10%
42	MONROE, TN	0.9634	27.3251	0.9573	23.4350	-0.63%	-14.24%
43	HUMPHREYS, TN	0.9463	18.6294	0.9569	23.1764	1.11%	24.41%
44	MARION, TN	0.9568	23.1395	0.9564	22.9462	-0.04%	-0.84%
45	HAYWOOD, TN	0.9580	23.8008	0.9564	22.9388	-0.16%	-3.62%
46	SEVIER, TN	0.9578	23.6777	0.9561	22.7855	-0.17%	-3.77%
47	**LEWIS, TN**	**0.9484**	**19.3872**	**0.9561**	**22.7551**	**0.80%**	**17.37%**
48	HARDIN, TN	0.9503	20.1386	0.9554	22.4233	0.53%	11.35%
49	JEFFERSON, TN	0.9554	22.4363	0.9554	22.4088	-0.01%	-0.12%
50	COCKE, TN	0.9631	27.1231	0.9553	22.3774	-0.81%	-17.50%
51	MACON, TN	0.9535	21.4906	0.9552	22.3327	0.18%	3.92%

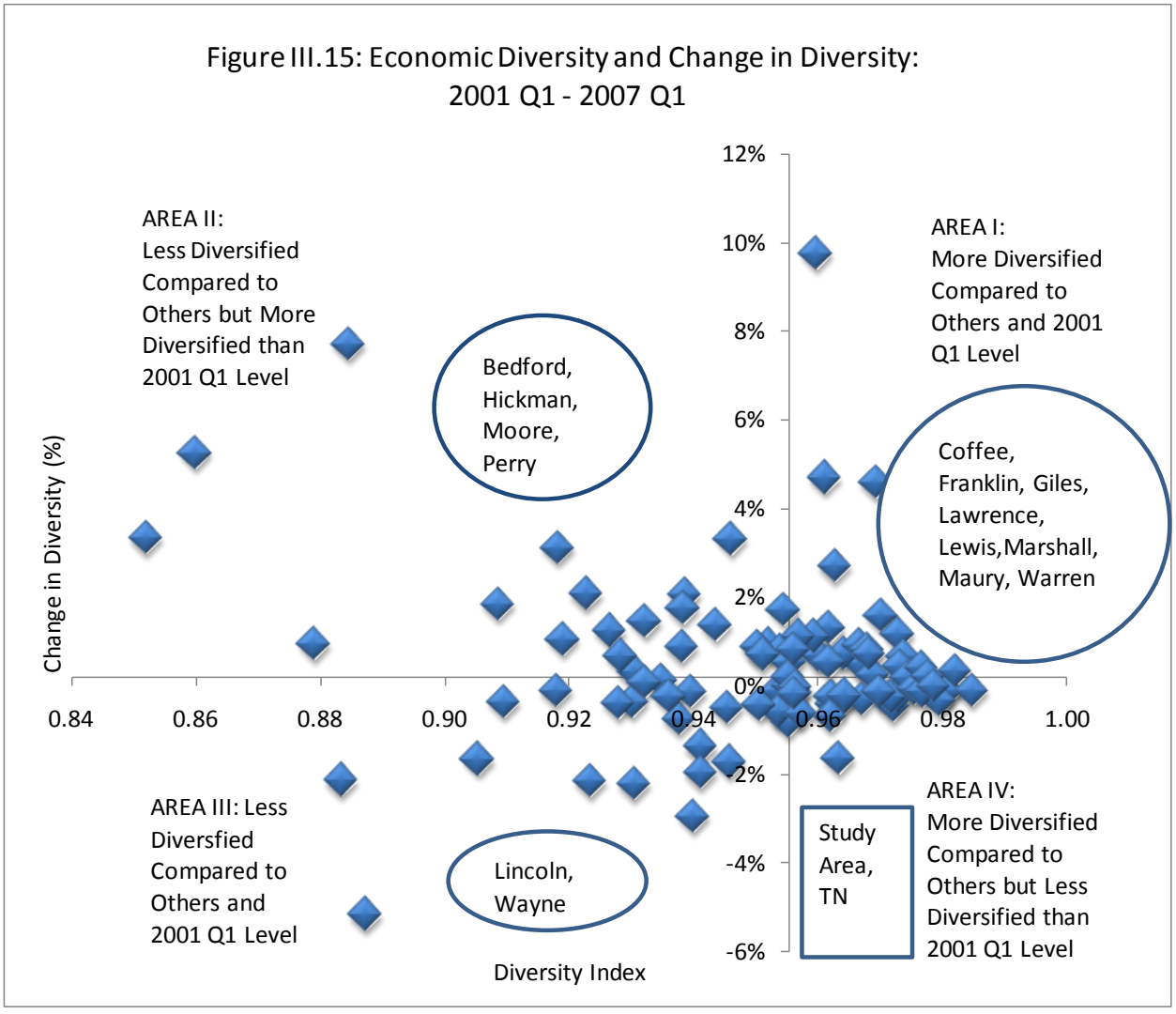
Table III.17 (Continued)

Rank	County	Economic Diversity: 2001 Q1 Index	Economic Diversity: 2001 Q1 Number of Major Industries	Economic Diversity: 2007 Q1 Index	Economic Diversity: 2007 Q1 Number of Major Industries	Change in Economic Diversity Index (%)	Change in Economic Diversity Major Industry (%)
52	CHESTER, TN	0.9385	16.2513	0.9545	21.9688	1.71%	35.18%
53	FAYETTE, TN	0.9467	18.7709	0.9540	21.7299	0.77%	15.76%
54	HAWKINS, TN	0.9594	24.6199	0.9537	21.5938	-0.59%	-12.29%
55	DECATUR, TN	0.9546	22.0264	0.9536	21.5361	-0.11%	-2.23%
56	**BEDFORD, TN**	**0.9434**	**17.6703**	**0.9522**	**20.9028**	**0.93%**	**18.29%**
57	OVERTON, TN	0.9446	18.0489	0.9512	20.4884	0.70%	13.52%
58	**LINCOLN, TN**	**0.9547**	**22.0566**	**0.9506**	**20.2449**	**-0.42%**	**-8.21%**
59	**HICKMAN, TN**	**0.9420**	**17.2430**	**0.9503**	**20.1071**	**0.88%**	**16.61%**
60	PICKETT, TN	0.9159	11.8940	0.9461	18.5462	3.29%	55.93%
61	DEKALB, TN	0.9624	26.6256	0.9458	18.4662	-1.72%	-30.64%
62	SMITH, TN	0.9502	20.0717	0.9455	18.3436	-0.49%	-8.61%
63	JOHNSON, TN	0.9309	14.4670	0.9435	17.7094	1.36%	22.41%
64	HENRY, TN	0.9600	25.0139	0.9412	17.0165	-1.96%	-31.97%
65	HARDEMAN, TI	0.9543	21.8731	0.9412	16.9971	-1.37%	-22.29%
66	WEAKLEY, TN	0.9685	31.7317	0.9399	16.6423	-2.95%	-47.55%
67	BENTON, TN	0.9409	16.9101	0.9396	16.5497	-0.14%	-2.13%
68	RHEA, TN	0.9197	12.4546	0.9386	16.2931	2.06%	30.82%
69	SEQUATCHIE, T	0.9223	12.8652	0.9383	16.2193	1.74%	26.07%
70	TROUSDALE, TI	0.9301	14.3143	0.9383	16.2077	0.88%	13.23%
71	ROBERTSON, T	0.9449	18.1559	0.9378	16.0653	-0.76%	-11.51%
72	UNION, TN	0.9383	16.1997	0.9361	15.6466	-0.23%	-3.41%
73	CLAIBORNE, TN	0.9338	15.0949	0.9348	15.3454	0.12%	1.66%
74	ROANE, TN	0.9314	14.5788	0.9322	14.7467	0.08%	1.15%
75	CLAY, TN	0.9188	12.3102	0.9322	14.7441	1.46%	19.77%
76	CROCKETT, TN	0.9276	13.8141	0.9306	14.3992	0.32%	4.24%
77	MCNAIRY, TN	0.9517	20.7044	0.9305	14.3928	-2.23%	-30.48%
78	GRAINGER, TN	0.9337	15.0759	0.9301	14.3140	-0.38%	-5.05%
79	MORGAN, TN	0.9221	12.8446	0.9283	13.9550	0.67%	8.64%
80	HOUSTON, TN	0.9318	14.6588	0.9280	13.8820	-0.41%	-5.30%
81	BLEDSOE, TN	0.9153	11.8048	0.9267	13.6365	1.24%	15.52%
82	SCOTT, TN	0.9438	17.7963	0.9235	13.0741	-2.15%	-26.53%
83	GRUNDY, TN	0.9040	10.4156	0.9228	12.9458	2.08%	24.29%
84	LAUDERDALE,	0.9096	11.0679	0.9190	12.3497	1.03%	11.58%
85	JACKSON, TN	0.8905	9.1364	0.9182	12.2228	3.10%	33.78%
86	STEWART, TN	0.9191	12.3533	0.9179	12.1875	-0.12%	-1.34%
87	POLK, TN	0.9130	11.4970	0.9096	11.0581	-0.38%	-3.82%
88	HANCOCK, TN	0.8923	9.2862	0.9087	10.9551	1.84%	17.97%
89	**WAYNE, TN**	**0.9207**	**12.6029**	**0.9054**	**10.5662**	**-1.66%**	**-16.16%**
90	CANNON, TN	0.9358	15.5747	0.8874	8.8782	-5.18%	-43.00%
91	**PERRY, TN**	**0.8213**	**5.5956**	**0.8846**	**8.6635**	**7.71%**	**54.83%**
92	CHEATHAM, TI	0.9028	10.2860	0.8835	8.5815	-2.14%	-16.57%
93	MEIGS, TN	0.6963	3.2930	0.8801	8.3419	26.39%	153.32%
94	**MOORE, TN**	**0.8709**	**7.7432**	**0.8790**	**8.2653**	**0.94%**	**6.74%**
95	VAN BUREN, TI	0.8170	5.4633	0.8599	7.1375	5.26%	30.64%
96	LAKE, TN	0.8245	5.6983	0.8520	6.7590	3.34%	18.61%
97	UNICOI, TN	0.9430	17.5568	0.8263	5.7583	-12.38%	-67.20%

BERC Estimates Based on Deaprtment of Labor and Workforce Development ES202 Data.

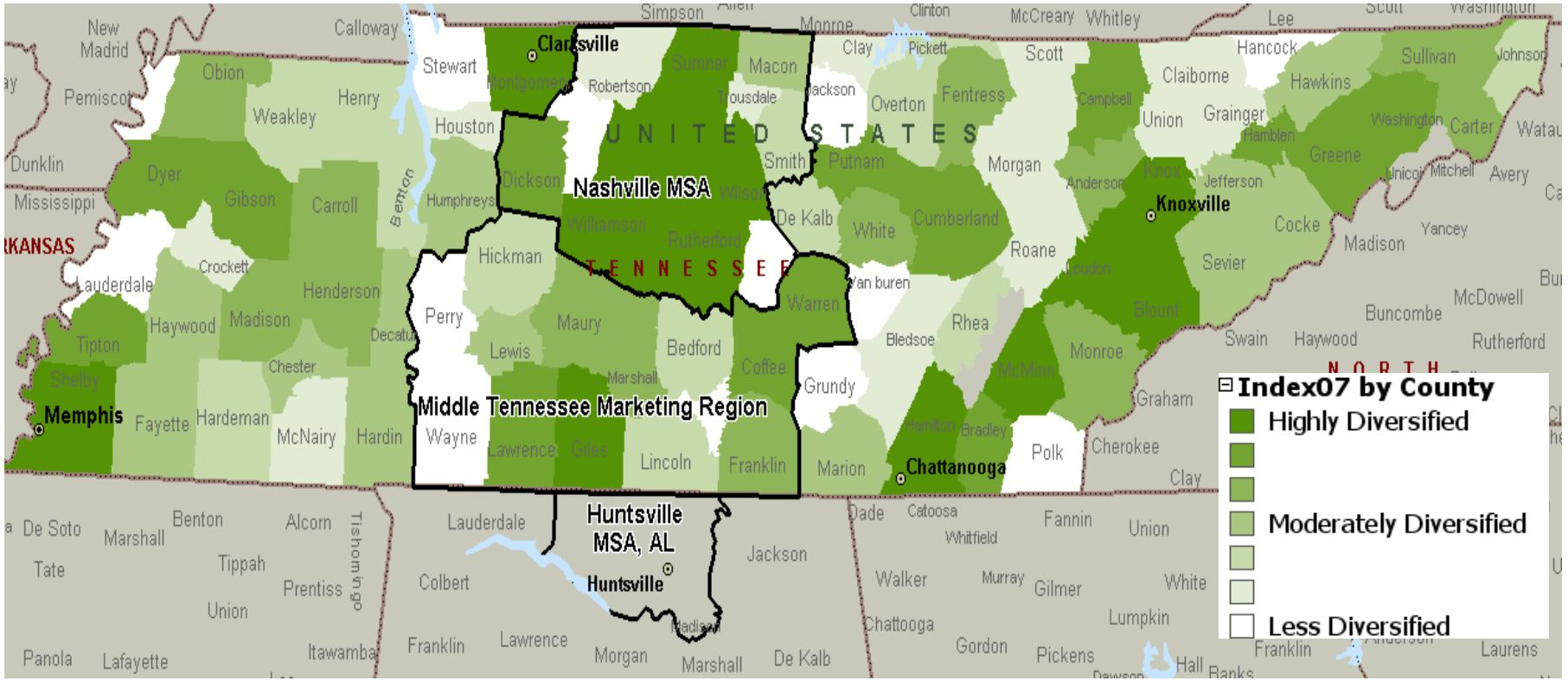
Note: Diversity Index ranges from 1 to 0. The highest score of (1) indicates a highly diversified economy where each industry's employment share is similar to the others. The lowest score of (0) indicates that the economy has only one industry employing all the workers.

Figure III.15 below presents economic diversity (2007 Q1) and percentage change in diversity from 2001 Q1. According to Figure III.15, eight (8) of 14 counties have relatively more diversified economies in 2007 in addition to an increase in their economic diversity from 2001 Q1 (area I). Four (4) counties (area II) have relatively less diversified economies in 2007 but increased their diversity from 2001. Two counties (area III) have relatively less diversified economies in 2007 along with a decreasing diversity score from 2001. The MTM region has a relatively well-diversified economy but experienced a slight decline in its diversity score from 2001 (area IV).

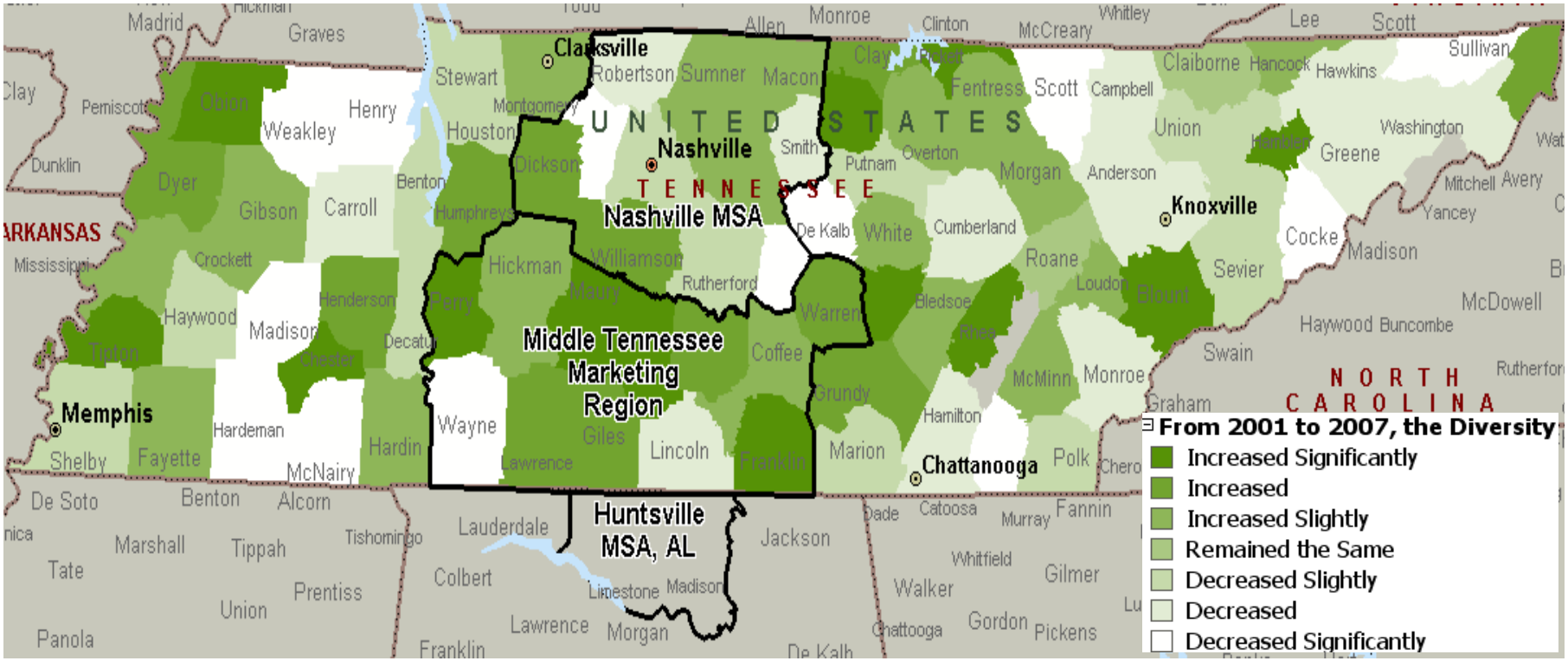


Maps III.4 and 5 provide a visual perspective on economic diversity in 2007 Q1 and percent change in diversity from 2007 Q1.

Map III.4: Economic Diversity by County



Map III.5: Change in Economic Diversity (2001 Q1-2007 Q1



III.5.f.Sectoral Diversity and Vulnerability

In this section, we look at the sectoral diversity within each of seven major industry groupings identified above. We also explore the implication of sectoral diversity for each of 14 counties involved.

Agriculture, Mining, Construction, and Utilities

There are 35 sub-sectors within this industry grouping. Table III.18 presents a diversity index by county for this major industry grouping. It is interesting to note that for this major industry grouping, the MTM region and Lincoln, Coffee, Lawrence, and Giles counties have a higher diversity index scores than Tennessee. For example, the effective number of sub-sectors within this group is 11.37 in the MTM region compared to 8.82 in Tennessee. The following counties have relatively large employment in this major sector but low diversity scores, exhibiting a certain degree of sectoral vulnerability: Franklin, Lewis, Hickman, Moore, and Warren.

Table III.18: Agriculture, Mining, Construction and Utilities

Region	Employment Share (%)	Employment Share Rank	Effective Industry Number	Diversity Index	Explanation
Study Region	5.98	8	11.37	0.91	
Lincoln	6.15	6	11.06	0.91	Employment is relatively evenly distributed across the industries
Coffee	4.51	14	9.73	0.90	
Lawrence	5.44	12	9.23	0.89	
Giles	6.55	4	9.03	0.89	
Tennessee	5.61	10	8.82	0.89	
Maury	4.95	13	8.50	0.88	
Franklin	**6.37**	**5**	**8.34**	**0.88**	
Bedford	6.14	7	7.80	0.87	Employment is primarily concentrated in a relatively few industries out of 35 potential industries in this general industry groupings
Lewis	**8.17**	**3**	**7.24**	**0.86**	
Hickman	**11.74**	**1**	**7.02**	**0.86**	
Marshall	5.49	11	6.81	0.85	
Wayne	4.38	15	6.25	0.84	
Moore	**5.95**	**9**	**5.95**	**0.83**	
Perry	3.15	16	4.63	0.78	
Warren	**10.39**	**2**	**4.00**	**0.75**	

Red Fonts indicate possible sectoral vulnarability in these regions given the size of the industry groupings in their economies and level of concentration of employment in a few sectors out of potential 35 sectors (4-Digit NAICS industries are used).

Manufacturing

In Tennessee, there are 85 sub-sectors at the 4-digit NAICS level within the broader manufacturing sector. Table III.19 presents a sectoral diversity index for the manufacturing sector by county. Tennessee tops the list with 0.97 index score and 35.93 effective sub-sectors. The MTM region is a distant second with a 0.94 index score and 16.02 effective sub-sectors. Relative sectoral vulnerability exists in Coffee, Warren, Bedford, Lincoln and Perry counties, where manufacturing employment is significantly high but the number of effective sub-sectors is low. In other words, employment in these counties is concentrated in a few types of manufacturing sub-sectors out of 85 manufacturing sub-sectors.

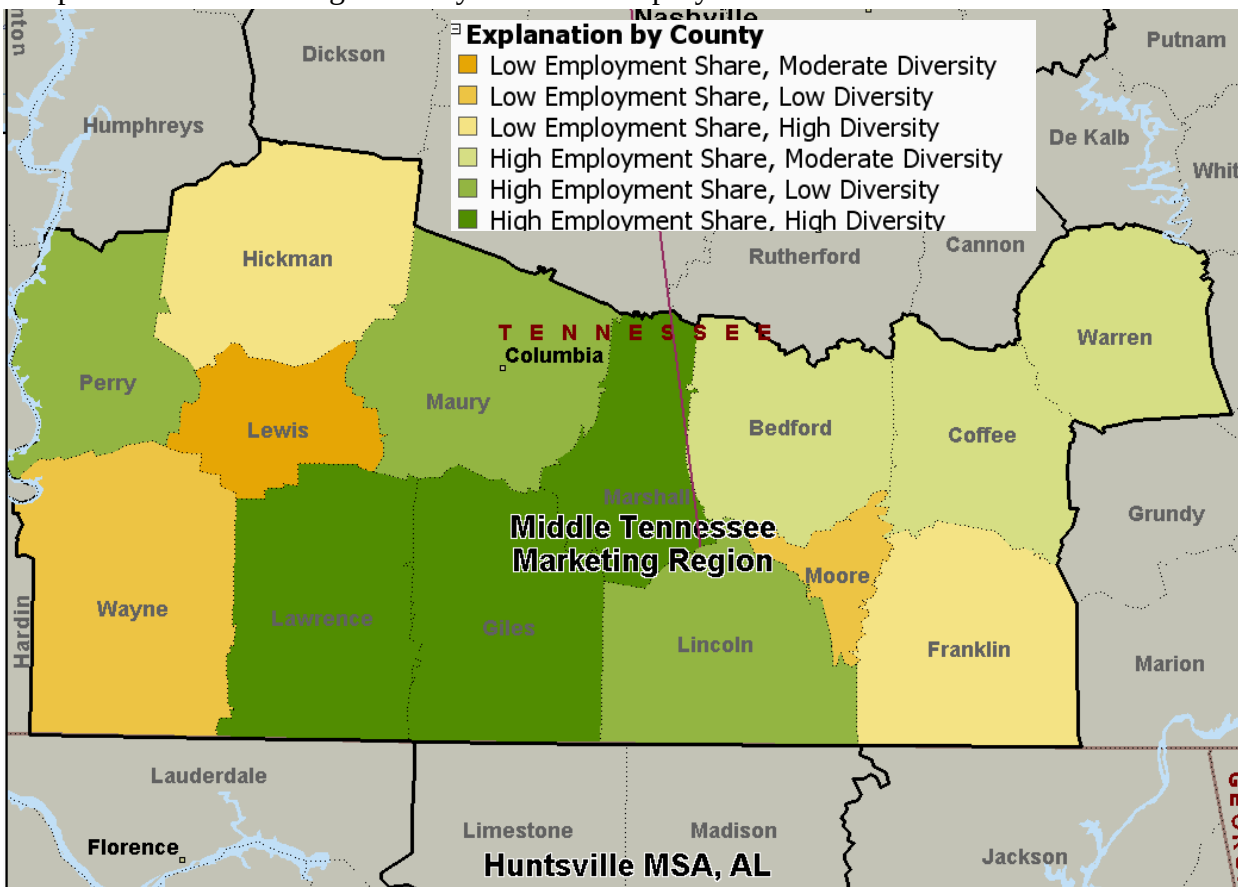
Table III.19: Manufacturing

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	14.48	15	35.93	0.97	
Study Region	26.09	7	16.02	0.94	Employment is
Marshall	35.00	3	10.79	0.91	relatively evenly
Hickman	19.45	11	10.18	0.90	distributed across 85
Giles	30.03	4	10.04	0.90	manufacturing sectors
Lawrence	21.66	9	8.25	0.88	at 4-digit NAICS level
Franklin	19.45	12	7.86	0.87	
Coffee	**24.19**	**8**	**6.42**	**0.84**	
Lewis	8.97	16	5.83	0.83	Employment is
Warren	**29.15**	**6**	**5.67**	**0.82**	concentrated in a few
Bedford	**37.41**	**2**	**4.53**	**0.78**	sectors out of 85
Wayne	17.90	13	3.73	0.73	manufacturing sectors
Lincoln	**29.19**	**5**	**3.10**	**0.68**	posing potential
Perry	**52.54**	**1**	**2.79**	**0.64**	vulnarability to the
Maury	20.78	10	2.27	0.56	counties
Moore	15.67	14	1.23	0.19	

Given the size of the manufacturing sector in these economies, the counties with red font indicates increased sectoral vulnarability to economic downturns due to the significant concentration of employment a few sectors out of possible 85 sectors at 4-digit NAICS level.

Map III.6 below presents a visual perspective on the relationship between manufacturing employment concentration and the manufacturing diversity index.

Map III.6: Manufacturing Diversity Index and Employment Concentration



Wholesale and Retail Trade

In this group, there are 46 sub-sectors in Tennessee at the 4-digit NAICS level. Tennessee, the MTM region, and Maury County top the list in terms of diversity and effective sub-sectors in wholesale and retail trade with 21.27, 15.17, and 14.78 effective sub-sectors, respectively. Lawrence County, Lincoln County, Lewis County, and Moore County exhibit a relative vulnerability in this sector, as they have a high employment share but employment is highly concentrated in a few sub-sectors out of 46 sub-sectors (Table III.20 below).

Table III.20: Wholesale and Retail Trade

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	16.85	5	21.27	0.95	Employment is relatively evenly distributed across 46 sub-sectors at 4-digit NAICS level
Study Region	14.90	8	15.17	0.93	
Maury	14.02	12	14.78	0.93	
Warren	16.65	6	13.50	0.93	
Coffee	14.10	11	12.50	0.92	
Giles	16.48	7	10.84	0.91	
Bedford	11.39	13	9.95	0.90	
Lawrence	**23.94**	**2**	**9.45**	**0.89**	Employment is concentrated in a few sectors out of potential 46 sub-sectors at 4-digit NAICS level posing scetoral vulnarability to the regional economies
Franklin	14.33	9	9.04	0.89	
Hickman	10.31	14	8.89	0.89	
Lincoln	**17.05**	**4**	**8.62**	**0.88**	
Marshall	14.28	10	8.27	0.88	
Wayne	9.88	15	6.33	0.84	
Perry	6.28	16	5.50	0.82	
Lewis	**24.30**	**1**	**4.23**	**0.76**	
Moore	**20.72**	**3**	**2.50**	**0.60**	

The counties with red fonts show critical sectoral vulnarabilities to economic shocks given the mismatch between the employment share of the sector and diversity score. This high concentration of employment in wholesale and retail employment may be due to the presence of big retail outlets.

Transportation and Warehousing

The transportation and warehousing has 29 sub-sectors at the 4-digit NAICS level. Coffee County, Tennessee, and Warren County top the list in this industry group with 4.79, 4.60, and 3.29 effective sub-sectors, respectively. Although the employment share of this industry grouping is relatively low, Lewis County, Lawrence County, and Bedford County have relatively low diversity scores and corresponding effective sub-sectors.

Table III.21: Transportation and Warehousing

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Coffee	1.19	15	4.79	0.79	
Tennessee	6.29	2	4.60	0.78	Even distribution of
Warren	2.03	10	3.29	0.70	employment across
Marshall	2.24	9	3.23	0.69	potential 29 sub-
Hickman	3.28	5	3.13	0.68	sectors at 4-digit
Perry	1.81	13	2.98	0.66	NAICS level
Franklin	1.87	12	2.94	0.66	
Giles	2.72	8	2.92	0.66	
Lincoln	1.94	11	2.69	0.63	
Study Region	3.10	6	2.63	0.62	
Maury	3.05	7	2.45	0.59	Concentration of
Wayne	1.51	14	2.34	0.57	employment in a few
Lewis	**6.21**	**3**	**1.91**	**0.48**	sub-sectors
Lawrence	**5.86**	**4**	**1.82**	**0.45**	
Bedford	**7.45**	**1**	**1.36**	**0.27**	
Moore					

The counties with red fonts have large share of their employment in this major industry groupings but the employment is concentrated in a few sub-sectors out of possible 29 sectors at 4-digit NAICS level.

Enabling Industries

There are 52 sub-sectors under this category. Tennessee, Lawrence County and Franklin County tops the list in terms of diversity and effective sub-sectors with 17.84, 14.98 and 14.35 sub-sectors, respectively. Bedford, Coffee, Marshall and Wayne counties have relatively high share of employment but low diversity score in this group (Table III.22).

Table III.22: Enabling Industries

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	18.61	3	17.84	0.94	
Lawrence	6.93	12	14.98	0.93	Even distribution of employment across 52 sub-sectors at 4-digit NAICS level
Franklin	5.60	14	14.35	0.93	
Study Region	14.88	6	12.21	0.92	
Maury	18.76	2	10.84	0.91	
Lincoln	8.50	11	10.52	0.90	
Giles	**12.79**	**7**	**6.79**	**0.85**	
Warren	**12.29**	**8**	**6.54**	**0.85**	
Lewis	8.91	10	6.45	0.84	
Hickman	6.16	13	6.19	0.84	
Bedford	**15.11**	**5**	**5.54**	**0.82**	Concentration of employment in a few sub-sectors
Coffee	**25.38**	**1**	**5.32**	**0.81**	
Perry	4.14	15	4.00	0.75	
Marshall	**11.63**	**9**	**3.86**	**0.74**	
Moore	2.76	16	3.06	0.67	
Wayne	**15.74**	**4**	**2.47**	**0.59**	

Counties with the red fonts show the concentration of employment in a few sub-sectors out of possible 52 sub-sectors given the employment share of this industry grouping.

Education and Health Services

Under education and health services, there are 25 sub-sectors at the 4-digit NAICS level. As Table III.23 demonstrates, Tennessee, Maury County, Franklin County, and Warren County have relatively high diversity scores and effective numbers of sub-sectors with 7.12, 6.01, 5.30 and 5.18 effective sub-sectors, respectively.

Not surprisingly, many counties in the region have a relatively high employment concentration in this major sector. However, in Hickman County, Moore County, and Wayne County, relatively high employment concentration does not coincide with sectoral diversity: in other words, employment in these counties is concentrated in a few sub-sectors out of 25 sub-sectors.

Compared to 14 counties and Tennessee, the MTM region has a relatively moderate employment concentration and diversity index in this major industry grouping. The MTM region trails behind Tennessee and four (4) other counties in terms of diversity.

Table III.23: Education and Health Services

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	21.08	10	7.12	0.86	
Maury	23.08	8	6.01	0.83	Employment is
Franklin	36.81	3	5.30	0.81	relatively evenly
Warren	18.38	14	5.18	0.81	distributed across
Perry	25.81	6	4.93	0.80	the sub-sectors
Study Region	21.94	9	4.93	0.80	
Lincoln	25.10	7	4.61	0.78	
Lewis	**27.52**	**5**	**4.38**	**0.77**	
Giles	19.32	13	4.28	0.77	Employment is
Coffee	17.57	15	4.26	0.77	concentrated in
Bedford	12.59	16	3.50	0.71	afew sub-sectors
Lawrence	19.79	11	3.33	0.70	out of possible 25
Hickman	**32.70**	**4**	**3.03**	**0.67**	sectors at 4-digit
Moore	**44.80**	**1**	**2.51**	**0.60**	NAICS level
Wayne	**40.20**	**2**	**2.27**	**0.56**	
Marshall	19.62	12	2.05	0.51	

The countries with red fonts indicate that employment is highly concentrated in a few sectors relative to employment share of this major industry grouping.

Amusement, Hospitality and Other Services

This industry grouping includes 30 sub-sectors at the 4-digit NAICS level. Tennessee, Maury County, and Franklin County top the list as having a relatively high diversity score and number of effective sub-sectors. Relative sectoral vulnerabilities exist in Lewis, Lawrence, and Lincoln counties, as they have relatively high employment concentrated in a few sub-sectors out of 30 sub-sectors.

Table III.24: Amusement, Hospitality and Other services

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	12.34	1	4.98	0.80	
Maury	11.84	3	4.32	0.77	Employment is
Franklin	11.18	4	4.00	0.75	relatively evenly
Coffee	9.35	8	3.82	0.74	distributed across
Giles	8.79	10	3.75	0.73	the possible 30 sub-
Study Region	9.41	7	3.70	0.73	sectors at 4-digit
Hickman	9.69	6	3.61	0.72	NAICS level
Wayne	6.01	14	3.21	0.69	
Lawrence	**12.13**	**2**	**3.05**	**0.67**	
Bedford	7.47	13	2.85	0.65	Employment is
Moore	4.93	15	2.82	0.65	relatively
Lincoln	**8.94**	**9**	**2.82**	**0.64**	concentrated in a
Marshall	7.57	12	2.65	0.62	few sub-sectors out
Lewis	**10.00**	**5**	**2.58**	**0.61**	of possible 30 sub-
Warren	7.60	11	2.53	0.60	sectors
Perry	2.17	16	1.94	0.49	

Lawrence, Lewis and Lincoln counties have relatively large share of employment in this industry grouping but their employment is highly concentrated in a few sectors out of possible 30 sub-sectors.

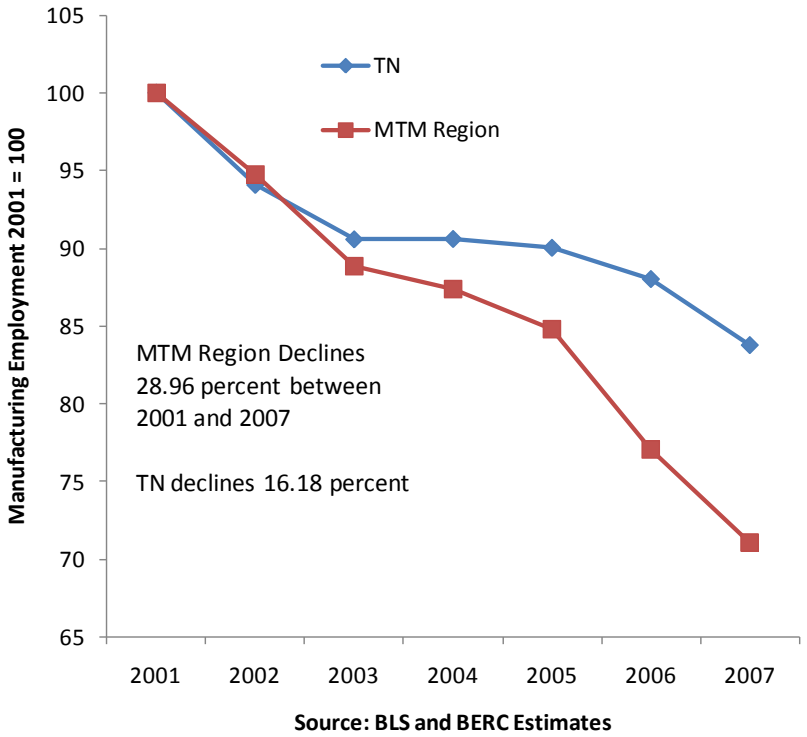
To conclude this section, the MTM region has relatively high economic diversity compared to other counties in Tennessee. Its diversity index is higher than 14 counties comprising the region, suggesting that counties complement each other rather than compete with each other. However, looking at the broader industry groupings at the county level, there is considerable room for each counties to diversify its economy. This is very much a necessity rather than an option for rural counties given the shifting economic landscape in rural communities.

III.6. A GENERAL ASSESSMENT OF PLANT CLOSING, RELOCATION, AND CONSOLIDATION IN TENNESSEE

III.6.a. Overview

The MTM region's economy heavily depends on the manufacturing sector. In some counties in the MTM region, the employment share of manufacturing is as high as 50 percent. Over the years, the decline in manufacturing jobs has been an increasing concern for many rural communities with a large manufacturing sector. Between 2001 and 2007, for example, Tennessee lost 73,379 manufacturing jobs, a decline of 16.18 percent. In the same period, the MTM region lost 15,047 manufacturing jobs, a decline of 28.96 percent. In fact, 20.51 percent of manufacturing job loss in Tennessee is from the MTM region. Figure III.16 below compares the MTM region with Tennessee in terms of manufacturing job losses.

Figure III.16: Manufacturing Employment Index



The primary goal of this short chapter is to shed light on the reasons for manufacturing job losses in Tennessee. Just following the daily headlines, we may be able to cite many reasons for the job losses in Tennessee. The first and by far the most important is the impact

of ongoing economic and financial crises that resulted in plant closings, especially increasing global competitive pressure that eliminated high-cost and less-productive companies from the marketplace. Second, in order to cope with emerging competitive dynamics, some companies went through significant restructuring processes, including consolidation, mergers, and domestic and international outsourcing. Finally, some companies relocated their plants overseas or to other states where the production cost was significantly lower and they received substantial business relocation incentives.

III.6.b. Method

To determine the reasons for job losses in Tennessee, we used the Lexis-Nexus Academic Universe business news database. We extracted all business news regarding plant closings and company relocations between 1997 and 2006. Various combinations of keyword searches for "company," "relocation," "Tennessee," "closing," "merger," and "restructuring" generated more than 1,000 industry news articles for each of the years we covered. After eliminating redundant industry news items, we extracted nearly 300 major company announcements for job losses.

III.6.c. Findings (is something missing?)

Sectors?

Table III.25: Layoff Events and Jobs Involved (1997-2006)

	Events		Jobs Involved	
Major sector	Number	Percent (%)	Jobs	Percent (%)
Accommodation and Food Services	3	1.01%	511	0.46%
Administrative and Support and Waste	5	1.69%	985	0.88%
Arts, Entertainment and Recreation	4	1.35%	179	0.16%
Construction	2	0.68%	218	0.19%
Education	7	2.36%	2,971	2.66%
Finance and Insurance	24	8.11%	8,197	7.33%
Healthcare	20	6.76%	14,481	12.95%
Information	8	2.70%	3,602	3.22%
Manufacturing	**165**	**55.74%**	**57,418**	**51.35%**
Mining	2	0.68%	1,582	1.41%
Other Services	2	0.68%	310	0.28%
Professional Services	11	3.72%	1,434	1.28%
Public Administration	4	1.35%	1,430	1.28%
Trade	24	8.11%	11,677	10.44%
Transportation	7	2.36%	4,658	4.17%
Utilities	8	2.70%	2,158	1.93%
Grand Total	296	100.00%	111,811	100.00%

Source: Lexis-Nexus Academic Universe & BERC Estimates

Between 1997 and 2006, about 111,811 jobs were eliminated in Tennessee through 296 layoff events. Fifty-six percent of these events and 51 percent of jobs were in the manufacturing sector, while the remaining 49

percent of jobs involved were distributed across 15 major sectors. Total manufacturing jobs involved in the layoff events were estimated at around 58,000.

According to Table III.25, healthcare, wholesale and retail trade, and finance and insurance followed the manufacturing sector with a combined job loss of about 34,000 (31 percent).

Reasons for Job Losses?

What are the reasons for job losses? Table III.26 shows the sectoral distribution of employment losses by reasons cited in the news.

Table III.26: Reason for Job Losses

Major sector	Decline in Business Demand	Financial Issues	Production-Related	Relocation	Reorganization in TN and Other States	Other	Outright Plant Closing
Accommodation and Food Services		160			235		116
Administrative and Support and Waste	370			230	255		130
Arts, Entertainment and Recreation	140				39		
Construction		150		68			
Education		2,684			287		
Finance and Insurance	108	468	608	700	6,313		
Healthcare	643	13,514			324		
Information		300			2,184	858	260
Manufacturing	**19,951**	**10,595**	**2,168**	**9,474**	**6,080**	**2,000**	**7,150**
Mining	82	1,500					
Other Services				135	175		
Professional Services	416	173			795		50
Public Administration	430	1,000					
Trade	1,707	553	100	120	7,897		1,300
Transportation	3,100	1,413		50	95		
Utilities	328	1,100	30		700		
Grand Total	27,275	33,610	2,906	10,777	25,379	2,858	9,006

Source: Lexis-Nexus Academic Universe & BERC Estimates

Among the primary reasons for job losses, financial issues top the list, while decline in business demand and reorganization and restructuring in Tennessee and other states were equally cited. In terms of manufacturing job losses, nearly 20,000 jobs were lost due to decline in business demand; 11,000 due to financial issues; 10,000 due to relocation outside Tennessee; and 7,000 due to companies going out of business, which may be the result of overseas competition.

Year of Announcements?

The largest layoff announcement was in 2002. Between 2002 and 2006, the annual average job loss was around 8,000 with a slight uptick in 2006. It is interesting to note that manufacturing job losses constitute nearly 90 percent of all layoff announcements in 2006 compared to 50 percent in 2002 (Table III.27).

Table III.27: Job Losses by Year and Sector

Major sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Accommodation and Food Services			160	235				116		
Administrative and Support and Waste			300			385	70	230		
Arts, Entertainment and Recreation					94	70	15			
Construction	68								150	
Education						2,378	425	138	30	
Finance and Insurance	700		4,168	592	523	626	738	400	30	420
Healthcare		217	295	51	169	10,162	3,080	115	392	
Information			1,000		570	932	1,100			
Manufacturing	**2,800**	**4,179**	**3,457**	**1,505**	**7,063**	**17,068**	**4,292**	**4,181**	**4,780**	**8,093**
Mining				82			1,500			
Other Services			135				175			
Professional Services	30	525	140	383		206			150	
Public Administration			300	130			800		200	
Trade	120	700	270	5,350	204	3,521	435		410	667
Transportation	50		200		3,035	95	1,278			
Utilities	280	326	166	30				1,356		
Grand Total	4,048	5,947	10,591	8,358	11,658	35,443	13,908	6,536	6,142	9,180

Source: Lexis-Nexus Academic Universe & BERC Estimates

Reasons by Year?

Table III.28 tabulates job losses by reasons and year. To give a brief highlight, relocation emerges as a major factor in 1997; financial issues in 1998, 2002, 2003, and 2004; reorganization in Tennessee and/or outside Tennessee in 1999, 2000, 2004, and 2006; decline in business demand in 2001, 2005, and 2006; and outright plant closing in 2005.

Table III.28: Job Losses by Reasons and Year

Reasons for Job Losses	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Decline in Business Demand	0.00%	10.88%	15.64%	18.20%	68.36%	18.40%	4.95%	19.28%	25.90%	59.05%
Outright Plant Closing	0.00%	14.88%	4.72%	0.68%	2.74%	11.29%	9.06%	6.12%	25.53%	0.17%
Financial-Issues	19.27%	43.48%	15.45%	3.09%	17.20%	40.15%	54.92%	39.92%	18.77%	7.77%
Other	0.00%	0.00%	0.00%	0.00%	0.00%	8.06%	0.00%	0.00%	0.00%	0.00%
Production-Related	0.00%	0.00%	0.00%	2.66%	5.88%	2.76%	0.72%	2.48%	9.44%	1.96%
Relocation	60.23%	0.00%	10.99%	0.00%	1.20%	12.89%	9.60%	5.05%	11.40%	1.09%
Reorganization in TN and Other States	20.50%	30.76%	53.21%	75.38%	4.62%	6.44%	20.76%	27.16%	8.95%	29.96%

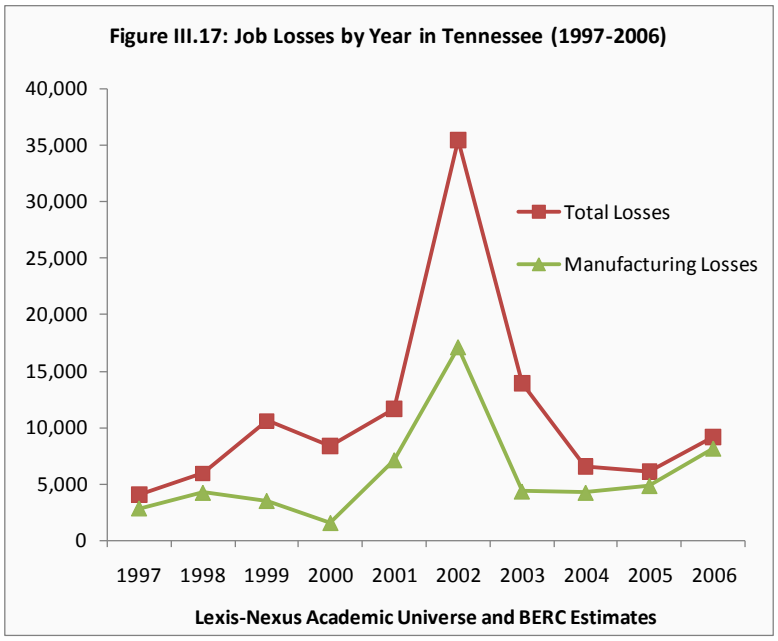
Source: Lexis-Nexus Academic Universe & BERC Estimates

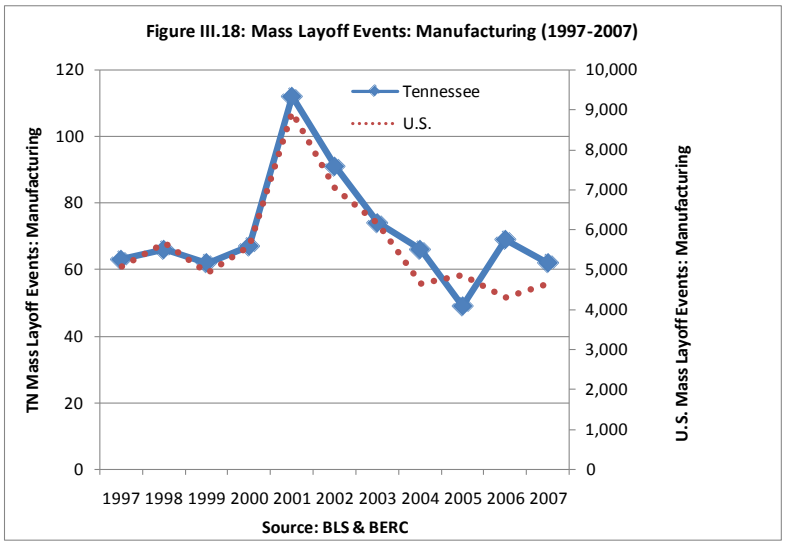
III.6.d. BERC Estimates versus BLS Layoff Statistics

We acknowledge the fact that BERC estimates of job losses and layoff events from published sources may not actually reflect real job losses reflected in official statistics. However, as the following two figures show, the BERC's event-data approach very much captures the layoff trend in Tennessee (Figures III.17 and 18).

Figure III.17 presents BERC estimates of total and manufacturing job losses in Tennessee. Estimates in Figure III.17 are based on event-data analysis using Lexis-Nexus Academic Universe.

Figure III.18 shows actual manufacturing mass layoff events in the U.S. and Tennessee between 1997 and 2007. The solid line in Figure III.18 shows Tennessee layoff events, while the dashed lines represent the U.S. Comparing these two graphs shows that we may gain important insights from analyzing event-data to capture the dynamics of job losses in Tennessee.





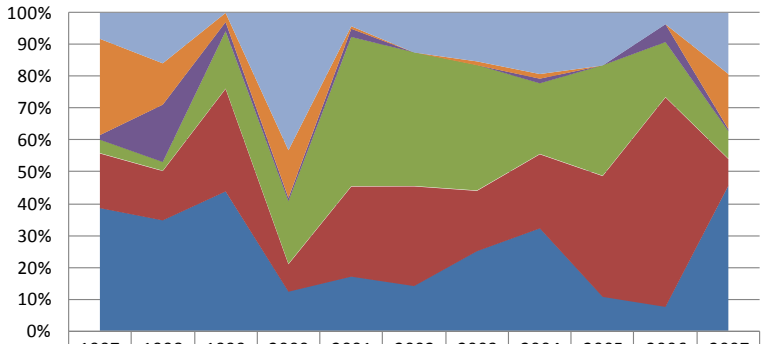
Reasons for Layoffs? Tennessee vs. the United States

Comparing Tennessee with the U.S. shows how two economies reacted to the prevailing economic and financial dynamics both in the U.S. and abroad. Figures III.19 and 20 tabulate BLS data by reasons for separations and year. As Figure III.19 indicates, business demand constitutes a significant share of separations in 2007. In our analysis above, 2006 was the year with significant business demand related job loss announcements. The time lag between layoff announcement and actual layoffs is clearly visible from these two sets of data.

As reflected in Figures III.19 and 20, reasons for layoffs by year show considerable differences between Tennessee and the U.S. Although reasons for separations show a stable pattern in the U.S., reasons for Tennessee fluctuate significantly: financial issues dominate the reasons for layoffs between 2001 and 2004; organizational issues became prominent between 2005 and 2006; and business demand was the primary reason between 1997 and 2000 and then in 2007.

Figure III.19: Reasons for Separations by Years: Tennessee

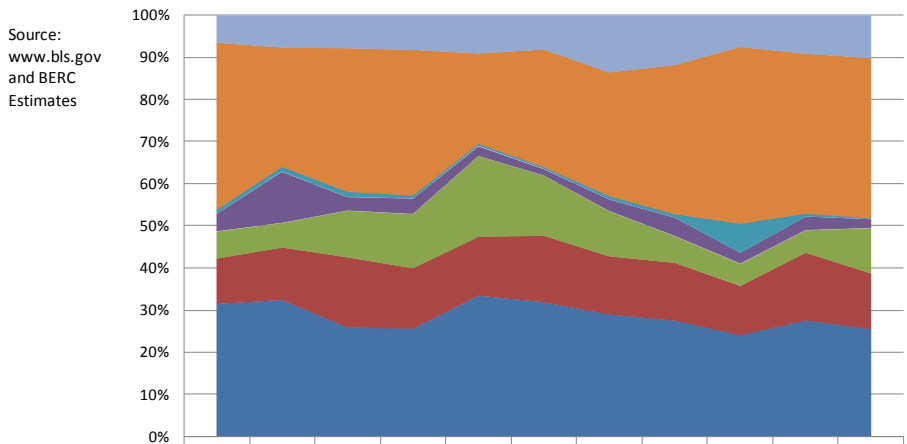
Source: www.bls.gov and BERC Estimates



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Other/Miscellaneous	549	560		4,043	494	1,663	1,249	1,293	1,369	318	2,847
Seasonal	2,035	460	100	1,404	100		100	100			2,572
Disaster/Safety											
Production Specific	100	637	100	100	308			100		502	100
Financial Issues	289	100	617	1,849	5,533	5,607	3,233	1,498	2,876	1,537	1,295
Organizational Changes	1,154	547	1,100	807	3,333	4,170	1,552	1,565	3,139	5,830	1,242
Business Demand	2,608	1,234	1,503	1,174	2,035	1,907	2,068	2,180	903	688	6,793

Figure III.20: Reasons for Separations by Years: U.S.

Source: www.bls.gov and BERC Estimates



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Other/Miscellaneous	59,690	73,282	68,853	73,055	134,012	99,932	160,192	116,588	66,031	84,913	94,140
Seasonal	365,636	274,054	301,794	309,591	320,533	344,938	349,063	352,001	370,986	355,091	353,817
Disaster/Safety	9,492	11,885	12,122	7,228	8,774	6,557	10,663	9,346	62,348	7,630	3,302
Production Specific	38,562	117,391	28,380	32,788	34,109	18,603	32,699	43,350	22,943	30,184	19,406
Financial Issues	59,703	56,740	98,494	115,352	287,223	177,128	127,779	63,350	46,243	50,380	100,422
Organizational Changes	99,029	120,374	146,921	128,378	208,263	194,667	163,691	135,977	103,266	149,893	122,665
Business Demand	289,867	312,756	229,461	229,028	497,573	393,524	343,789	273,297	212,844	257,878	237,301

To conclude, the manufacturing sector has been in decline across the rural counties in Tennessee. Many of these rural counties have heavily relied on traditional manufacturing sectors. Due to a continuous decline in the manufacturing sector, the MTM region has experienced dramatic changes. Knowing the causes of job losses may help these communities to proactively develop strategies to save their employment base. In this brief, we attempted to shed some light on the subject, but more work was needed to carefully detail the reasons for the plant closings and production-related issues.

IV. IDENTIFYING AND ANALYZING REGIONAL CLUSTERS IN THE MTM REGION

IV.1. Overview

What are industry clusters? Why are they important for a regional economy? How can we identify and analyze them? These are some of the questions this section aims to address. As previously defined, this study's regional focus is the 14-county Middle Tennessee Marketing (MTM) region.

Industrial clusters are defined as groups of industries concentrated in a geographical area and connected with each other both vertically (backward-forward linkages) and horizontally (sharing common resources, technology, human resources, etc.) (Porter, 1990, 2000; Feser and Bergman, 2000; Feser, 2005). This definition of cluster highlights three distinct features of industrial clusters: (1) region—defined in a way that captures backward (supplier industries) and forward (customer industries) linkages adequately; (2) linkages—having similar buyers and suppliers; and (3) common resources—sharing a common labor pool, technology, and other regional assets.

Why are industrial clusters important? They are considered sources of regional economic competitiveness and innovation. An industrial cluster focused economic development strategy benefits a region by (1) improving synergies between suppliers and customer industries, (2) strengthening the supply-chain, thereby reducing the cost of doing business and also creating new business and employment opportunities; and (3) addressing issues concerning factor conditions, thereby encouraging skill and technology upgrades.

As Porter (1990) argues, once a cluster is formed, it becomes larger and more effective than the sum of industries constituting the cluster, creating a wide-ranging ripple effect throughout a region's economy. Therefore, identifying and analyzing all aspects of industrial clusters at the regional level is likely to stimulate employment and wealth growth.

How can we then identify and analyze industrial clusters? Once we identify them, what is next? In the past two decades, a growing body of literature emerged dealing with industrial clusters and their impacts on regional economies. A review of this literature suggests there is no single and best way of identifying industrial clusters. Depending on the scope of policy questions asked, the use of methodology differs. However, nearly all cluster analyses group industries using certain common features: (1) backward-forward linkages, (2) basic and non-basic industries (specialization), (3) common labor pool and/or technology, (4) performance level, and (5) commodity import.

This study utilizes a hybrid approach to identify and analyze industry clusters in the MTM region informed by a wide range of empirical studies. Our primary concern in this study is to develop actionable policies in the MTM region. To achieve this goal, we utilized both survey-based and model-driven industry cluster analyses. Surveys and interviews were designed to capture the history of regional industrial clusters, factor conditions, and regional and firm-level risk factors, which were informed by Porter (1990).

Before proceeding further, we would like to clarify the meaning of certain concepts used in the industrial cluster literature: (1) driver industry analysis refers to the identification of industries/clusters that are driving a region's economy, may or may not require a pre-determined set of industry clusters, and may be as simple as identifying industries based on a specialization index (location quotient) or as complex as first identifying industrial clusters and then performing discriminant analysis based on a set of indicators that measure each industry's performance, specialization, and depth in a region's economy; and (2) target industrial clusters requires first identifying industry clusters and then using a set of regional cluster and industry indicators to select target industrial clusters. Target clusters are not necessarily top-performing clusters in a region's economy. These are the clusters that may have greatest impact on the region's economy through synergies, import substitution, economic diversity, workforce development, etc. Target industrial clusters will be our major focus in chapter V.

In the sections that follow, we first provide a brief literature review and conceptual framework. After a short introduction of the input-output model and its central place in this analysis, we present findings from interviews and surveys. Finally, we introduce industrial clusters in the MTM region.

IV.2. Literature Review

The primary focus of our study is to identify a set of industry clusters with high degree of linkages, both direct and indirect. As defined by Steiner (1998), an industry cluster is a group of industries that are interdependent in both economic and social space. Such interdependence is based on the sharing of similar resources such as suppliers, customers, labor, or technology. Porter (2000) argued that a cluster is a group of competitive industries that could be geographically concentrated and share common components.

There is a rich body of literature on industry cluster identification. The study by Feser and Bergman (2000) is among the earliest attempts to identify national clusters of U.S. industries. They derived a national industry cluster template in the manufacturing sector using the 1987 Benchmark Input-Output Accounts, based on the Standard Industrial Classification (SIC). The methodology they used followed Czamanski (1974), which built on the construction of the transaction matrix for

each pair of industries. Four correlation coefficients for each pair were calculated, and the maximum for each industry was selected. Finally, they used the symmetric matrix with each element as the maximum correlation coefficient for factor analysis. Feser (2005) updated Feser and Bergman (2000) to the 2002 North American Industry Classification System (NAICS). The data in this study was no longer restricted to the manufacturing sector but covered all sectors in the U.S. A much simpler and more flexible methodology was utilized in Feser (2005). We will follow his methodology and detail it in the next section. Additionally, Kelton, Pasquale, and Rebelein (2006) used the classical Czamanski (1974) method in an attempt similar to Feser's (2005) to construct a mixed-sector cluster template using the1997 Input-Output Accounts for the U.S.

Johnson et al. (2005) presented a joint analysis of cluster and occupation. In particular, the study provided a linkage between instructional programs, occupations, and industries. Analogous to industry cluster analysis, occupational cluster analysis groups industries from the same pool of skilled workers. By combining the two methods, the authors exhibited a clear picture of the industry targets along two dimensions: the regional industry base and the regional workforce base. Compared with other studies just focusing on industry cluster, their work identified industries that are not only competitive in the region but also compatible with the local labor forces.

Peters (2004) classified industries in his first step using several different methods such as Ward's method, the squared Euclidean distance method, and the centroid method. All methods generated highly similar clusters as expected. Discriminant function analysis was used to identify a set of variables that drove the classification process. I his second step, the author examined the degree of interdependence using factor analysis and identified nine supplier-based industry clusters in Missouri.

Hill and Brennan (2000) provided more insights on industry cluster analysis using data for the Cleveland-Akron metropolitan area. They combined cluster analysis with discriminant analysis to identify the driver industries, in which a region has its greatest competitive advantages. Four sets of indicators of competitive advantages such as centrality and employment specialization were defined for discriminant analysis. Their method has attracted considerable attention. Held (2004) applied the same approach for industry cluster analysis of seven metropolitan statistical areas (MSAs) of New York State.

Other studies on industry cluster analysis addressed the role of rural economies in the national value chain. For example, Feser and Isserman (2007) investigated the role of the rural economy by exploring the overall rural-urban distribution of U.S. industry value chains and their functional economic characteristics in rural versus urban areas and then searched for multi-county regions of high employment in a

motor vehicles value chain to explore the rural locations' contributions. Their study noted the importance of distinguishing betweenthe economic and geographic dimensions of industry cluster concepts and simultaneously deepened understanding of the role rural economies played in the national value chain.

In this study, we replicated Feser's (2005) methodology to identify and align industrial clusters in the MTM region with the national cluster template.

IV.3. Conceptual Framework

As briefly mentioned in Chapter II, we used a variety of methods to identify and analyze industrial clusters in the MTM region. The purpose of this section is to open up some of the stages specified in Chapter II to provide detailed insights into the cluster identification process. As Chart IV.1 indicates, we used surveys and interviews to understand and analyze cluster history, factor conditions, related industries, regional and firm-specific risk factors, and survey-based industrial clusters.

In addition, we used an input-output model to identify industry clusters in the MTM region. In this section, we used Feser's (2005) methodology to identify industry clusters. After identifying initial clusters, this study then utilizes national cluster templates (Feser, 2005) to clearly define sub-clusters and then identify the gaps in existing regional clusters compared to national template. Using this method allows us to use cluster analysis to develop target industrial clusters by identifying gaps in clusters, connecting clusters to technology clusters, measuring cluster imports, and identifying major cluster jobs.

IV.4. Input-Output Model

In order to provide a consistent data analysis, this study utilizes IMPLANpro extensively (www.implan.com). The IMPLAN input-output system allows us to mine its reach database to extract an industry-by-industry transaction matrix and to manipulate exports, imports, productivity, GDP, and other indicators. We used the MTM region model with the latest available indicators (2006). Further information about the model and its components is available at www.implan.com.

At the heart of the input-output model is the flow of commodities from producers to final consumers. The total value of commodities produced is equal to total industry purchases, which comprise commodities, services, employment compensation, value added, and imports. The model itself is driven by final demand. The mechanism in the model captures linkages among industries by tracing all goods and services purchased by an industry to produce goods and services for final

demand. This process of buying and selling stops at a certain point because of the outflows (leakages) from the region in the form of imports and value added.[1]

In addition to the IMPLAN database for the MTM region, we also utilize "industry by occupational matrices" from IMPLAN. Because these matrices are aligned with theIMPLAN sectoring scheme, they allow us to easily identify top occupations by given industrial clusters.

[1] The IMPLAN input/output accounting is fully described in *The IMPLAN Input/ Output System* at www.implan .com.

IV.5. REGIONAL STAKEHOLDER INTERVIEWS: HISTORICAL PERSPECTIVE ON REGIONAL INDUSTRY CLUSTERS AND ISSUES

IV.5.a. Overview

A target cluster analysis would not be complete without input from local stakeholders. During the course of this study, we conducted a total of 50 interviews in the MTM region. We interviewed 21 local economic development and elected officials across 14 counties. Furthermore, we interviewed 29 business leaders across 14 counties.

Interviews have provided important insights into the cluster history in the MTM region, existing clusters and current challenges, future expectations and challenges, and regional interactions to promote a healthy business environment. In the sections that follow, we first discuss the survey methodology and then present the findings in a question-and-answer format.

IV.5.b. Interview Methodology

For this study, we identified 123 business leaders in the manufacturing sector throughout the region as well as 28 mayors and local economic development officials. The number of total targeted interviews was 151. Throughout the study period, 21 mayors and local economic development officials were interviewed with a 75 percent success rate, while 29 businesses were interviewed with a 24 percent success rate. Overall, we secured 50 interviews with nearly a 33 percent success rate.

In terms of interview questions, we directed four major questions to local stakeholders:

1. W are the historical economic clusters in the MTM region?
2. What are the current economic clusters in the MTM region?
3. What kinds of clusters are likely to emerge in the future in the region?
4. What do you think is the state of business-to-business interactions in the MTM region?

The average interview lasted about 50 minutes with individual interviews ranging from 30 to 120 minutes.

Table IV.1 below presents county distribution of the conducted interviews. All 14 counties in the region are represented, involving a diverse group of businesses from agribusinesses to automotive suppliers.

Table IV.1. Percent Distribution of Interviews by County

County	Percent (%)
Bedford	18
Coffee	18
Franklin	8
Giles	4
Hickman	6
Lawrence	8
Lewis	6
Lincoln	4
Marshall	6
Moore	2
Maury	8
Perry	2
Warren	6
Wayne	4
Total Interviews (N)	50

MTSU Business Interviews

IV.5.c. Economic History of the MTM Region

Many stakeholders we interviewed indicated that traditional manufacturing companies have ended their half-century presence in the MTM region, affecting all aspects of regional life. This massive outflow of manufacturing companies led to the loss of 10,000 jobs in the past decade. The region is still shedding jobs. Many stakeholders believe that NAFTA triggered the whole process.

The job impact in the traditional manufacturing sector has been on two fronts: (1) relocation of area businesses overseas and to other states, and (2) shrinking number of companies remaining in the region due to loss of customers. Over the years, a particularly negative sentiment emerged in the MTM region toward branch operations, as these companies were the ones first leaving the area without consulting local leadership and some of these branch operations constituted nearly one-fourth of total county employment.

Impact of Overseas Competition. International competition has had a devastating impact on the largest companies in the region. In certain instances, local companies were bought and eliminated overnight. Area businesses value international competition. However, their chief concern is that companies located overseas do not face the same regulatory environment and cost structure companies in the MTM region face. It is not technology or productivity that makes the MTM businesses less competitive vis-à-vis international competition but cheap labor and low environmental standards overseas. Many businesses call for political

action that would level the playing field for all businesses. Implications for the MTM regional economy are that (1) farms are consolidated, (2) manufacturing jobs with decent pay are gone, and (3) existing businesses are feeling squeezed and uneasy.

Companies Defying the Trend. Although there is increasing pressure on companies emanating from international competition and the relative cost of doing businesses, some companies have defied the trend in the region. Often these companies are those

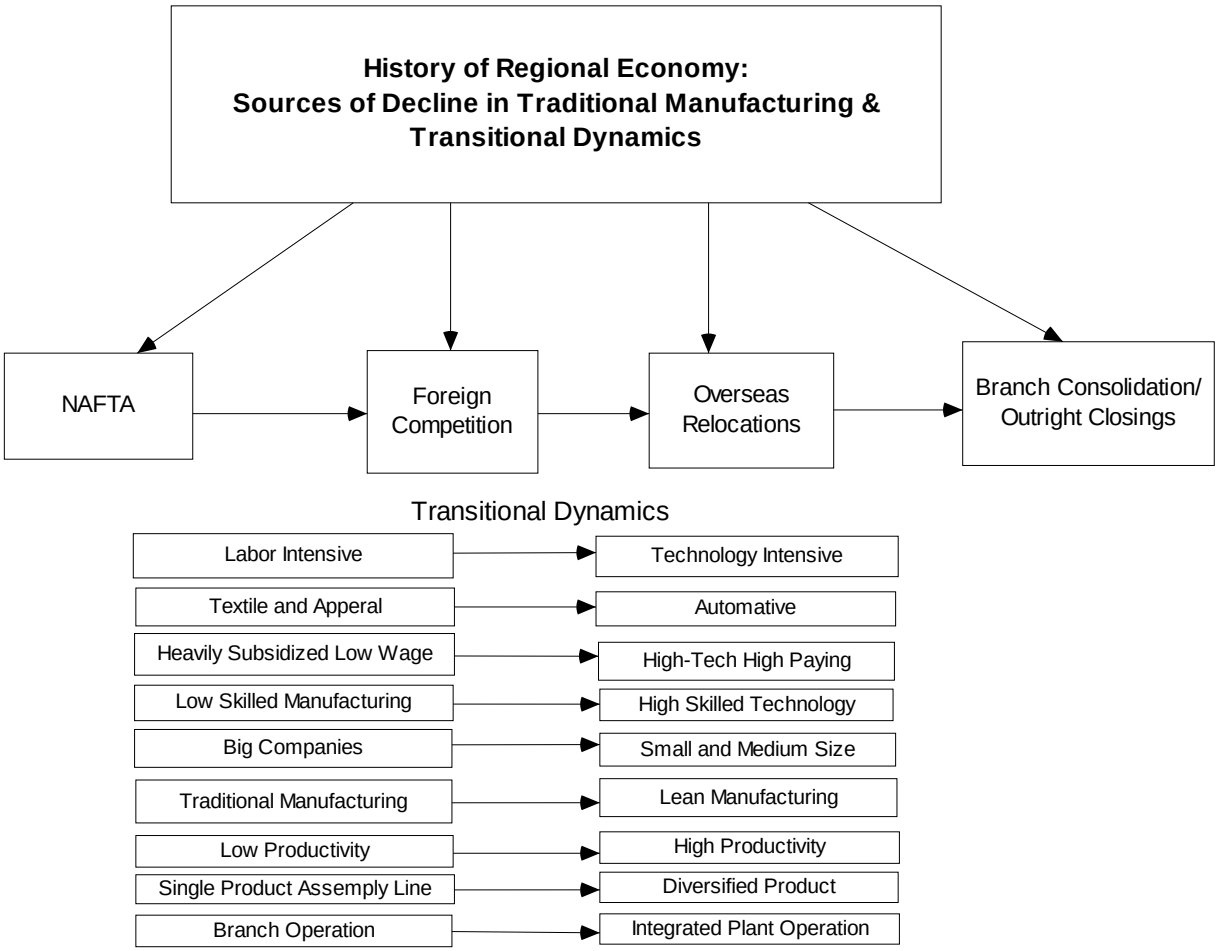
1. diversifying their product lines,
2. heavily invested in technology and new products,
3. upgrading their manufacturing technologies but at the expense of some job losses,
4. operating in healthcare niche markets,
5. producing hazardous materials and subject to extensive regulations but at the expense of significant loss in productivity, or
6. investing in their employees and in the MTM region.

IV.5.d. Current Business Environment: Transitions and Tensions

The MTM region is still in transition. Every single day, it is still possible to hear plant closing announcements. Furthermore, current financial crises are affecting all businesses. Against this backdrop, there are other trends that may help the MTM region's manufacturing sector. Increasing raw material and energy costs increase the cost of importing from overseas, thereby creating a window of opportunity for local businesses to capitalize on this trend. Likewise, the decreasing value of the dollar generates export opportunities for local manufacturers. Two other international trends are also likely to have positive impacts on area manufacturers: (1) quality concern of imported products and (2) increasing cost of doing businesses in overseas markets.

Before analyzing the current challenges facing businesses, let's look at the transitional dynamics in the MTM region. As highlighted in Chart IV.2 below, local stakeholders trace the whole chain of manufacturing events in the region to NAFTA. Then the competition from China intensified, creating massive outflows of companies overseas as well as branch consolidation and plant closings. In terms of transitional dynamics, there have been multiple dynamics at work, generating increasing tensions in rural counties but also opportunities to reinvent themselves.

Chart IV.2: Transitional Dynamics in MTM Region: Interviews



While there have been ongoing transitions in the local business environment, local stakeholders have specific concerns about the current business environment and business practices:

1. concern about too much emphasis on the automotive industry and
2. concern about too much emphasis on "big businesses" (many stakeholders believe that the MTM region's future is in small to medium-size businesses).

Although the MTM region has shed a significant number of manufacturing jobs, business leaders believe that the MTM region has potential for growth. In order for the MTM region to grow, however, local stakeholders recommend the following actions:

1. focus on how to stay competitive regionally,
2. increase highway capacity,

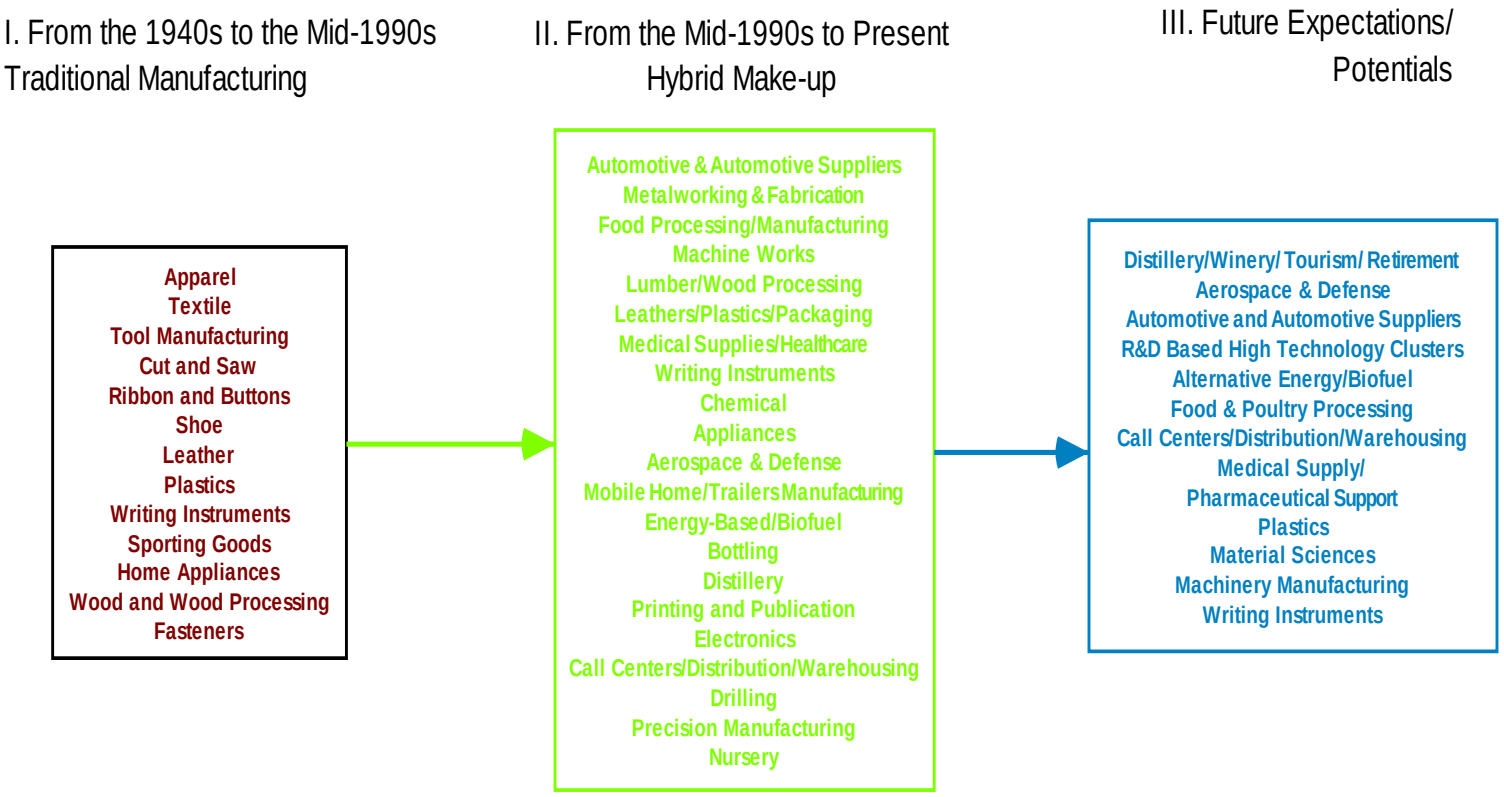
3. develop an aggressive business strategy to market the area regionally,
4. connect the region to Alabama, needed to make a fresh start in the defense industry,
5. institute new policies to help small businesses, which are the engine of growth, since current job creation incentives are not practical for them,
6. emphasize "lean manufacturing" and centers for manufacturing excellence, since productivity increase and technology investment are key to the MTM region's future, and
7. build up regional technical resources.

IV.5.e. Past, Present, and Future of Industry Clusters in the MTM Region

From a historical perspective, the MTM region has experienced a shift in manufacturing employment. This shift has occurred from traditional manufacturing, which dominated the period between the early 1940s and the mid-1990s. The current economic landscape represents the remnants of past industries in addition to the heavy presence of the automotive industry: a hybrid system. The future is likely to be dominated by service industries, automotive, defense-related, and bio-fuel, according to interview results. Chart IV.3 below summarizes this process.

Chart IV.3:

Historical Evolution of Regional Economy: From Traditional Manufacturing to High Tech Defense and Service Industries



IV.5.f. Current Industry Clusters: Their Performance and Challenges

We processed 100 sound bites regarding current industry clusters throughout the interviews. The resulting tabulation of current clusters is presented in Table IV.2 below.

Automotive and automotive suppliers top the list of clusters. Metalworking and fabrication, food processing, and machine works constitute the next. The third group comprises clusters that include lumber/wood processing, leather/plastics/ packaging, medical supplies/healthcare. The fourth major group includes writing instruments, chemical, and appliances.

Table IV.2. Current Industry Clusters (ranked by the number of frequency)

Clusters	Percent Cited (%)
Automotive & Automotive Suppliers	17
Metalworking & Fabrication	9
Food Processing/Manufacturing	8
Machine Works	8
Lumber/Wood Processing	7
Leathers/Plastics/Packaging	7
Medical Supplies/Healthcare	6
Writing Instruments	5
Chemical	5
Appliances	5
Aerospace & Defense	4
Mobile Home/Trailers Manufacturing	3
Energy-Based/Biofuel	3
Bottling	2
Distillery	2
Printing and Publication	2
Electronics	2
Call Centers/Distribution/Warehousing	2
Drilling	1
Precision Manufacturing	1
Nursery	1

MTSU Interview

Their Performance. Regional stakeholders first highlighted issues concerning the regional and national business environment. According to interview results, the business environment in the MTM region is pretty stable. The region is considered a good place to do business.

However, several issues and concerns need to be addressed. These concerns are that (1) the MTM region needs a fast-track program activation; (2) the region is producing less and less; (3) the high automotive concentration creates weakness for the region; and (4) property tax on equipment further erodes already thin margins.

In addition to these regional concerns, national trends and issues are affecting regional businesses, which is no surprise due to the nation's ongoing financial crisis:

1. High overseas competition is affecting the region's businesses.

2. Increasing material costs and energy prices are a big concern; regional supplier industries are feeling squeezed as the cost of production increases, but they can't increase their prices due to customer industries' resistance.

3. The housing downturn has affected the lumber and wood processing industries.

4. Relocation of businesses overseas has shrunk certain industries due to the loss of customer industries.

Overall, according to interview results, the following industries are doing OK or growing: automotive due to automation, plastics and packaging, distillery, metal fabrication, niche markets—explosive manufacturing, agribusiness, injection molding, lumber and logging, and traditional manufacturing with government contracts.

When we asked which industries are not performing well, we received the following responses: (1) small businesses are struggling because of increasing material costs; (2) automotive suppliers are feeling squeezed; (3) air conditioning and fabricated metal are feeling squeezed; and (4) the margin for writing instruments is razor thin, and business is very slow. Overall, half of businesses are experiencing a low to moderate growth rate.

Current Challenges. What are the challenges for clusters in the MTM region? Among all responses, four (4) stand out very clearly: (1) all aspects of the workforce are seen as the major challenge topping the list, with many businesses indicating they are happy with their current employees but that new hires are posing a great challenge, citing specific concerns including "lack of technical skill," "availability and quality," "shortages," "skills," and "math and science skill; (2) the cost of doing business is affecting especially small businesses and suppliers, specifically "raw material cost," "energy cost," "utility cost," and "logistics; (3) international competition is still a concern, especially China and NAFTA; and (4) workers compensation for small businesses is a big concern (while many businesses acknowledge that certain improvements have been made in this area over the years, small businesses are currently more burdened than big businesses in terms of dealing with this issue). Table IV.3 below provides all major concerns expressed by local businesses.

Table IV.3. Challenges for Current Industry Clusters

Challenges	Percent cited (%)	Challenges	Percent cited (%)
All aspects of workforce	19.07	Local funding challenges to expand services (infrastructure)	2.58
lack of technical skill		State red tape	2.58
availability and quality		Failure of secondary school system	2.58
shortages		Water supply/waste water treatment	2.58
skills		Tax (local, personal, corporate) & abatement	2.06
math and science skill		Education	2.06
Cost of doing business	11.86	Unemployment & underemployment	2.06
raw materials		County-centric thinking	1.55
energy		Environmental regulations	1.55
utility		Transportation/supply cost	1.55
logistics		TVA rate increase	1.03
International Competition	11.34	Broadband accessibility	1.03
China, NAFTA, Others		Retail leakage/less shopping opportunities	1.03
Workers comp for small businesses	7.73	Union mindset	1.03
Healthcare	4.64	Getting defense contracts for companies	0.52
Work ethic	4.12	Business friendly attitude	0.52
FMLA abuse		Rural and remote	0.52
turnover		Local leadership (not coming together to face challenges)	0.52
commitment		Economic leadership	0.52
General economic environment	3.61	Not availability of high paying jobs for area graduates	0.52
4-Lane highway	3.61	Loss of customer base to overseas	0.52
Retaining existing businesses	3.09	Consolidation of branch operations	0.52
incentives		Decent rail services	0.52
grants for tech investment		New generation employee turnover	0.52
small business incentive packages		Regional marketing	0.52

MTSU Interview Results

Recommendations to Overcome Challenges. We asked local leaders how to overcome some of the challenges businesses in the MTM region are facing. Following is a summary of those recommendations:

1. Leveling the playing field is a must to offset the impact of international competition. Especially, quality of imports should carefully be scrutinized.
2. "Just-in-time" manufacturing is critically important, and the counties in the MTM region need four-lane highways to become "just-in-time" supply centers. Local governments are struggling to complete projects.
3. State red tape is a major challenge for businesses and must be eliminated.
4. Small businesses are paying hefty prices for increasing utility costs.
5. Leadership should make sure that the foundation is strong and reduce the chances of further employment losses from rural areas.

6. The work many businesses do does not require advanced education, but the new generation does not have basic math skills.
7. Nontraditional technical schools are absolutely necessary to address business needs.
8. Economic development officials' attitude must change: their concerns are adding more jobs, but our concern is about surviving and sustaining.
9. Counties need to work together to address water, transportation, regional park infrastructure and skilled workforce issues.
10. Policies for existing businesses are urgently needed. New legislation that gives incentives for companies expanding in rural areas is necessary.
11. The region is in the middle of a high-tech corridor that should be leveraged.

Ways to Improve Regional Competitiveness. We also asked the regional stakeholders their opinions about increasing regional competitiveness. As reflected in Table IV.4, top four recommendations include (1) improving education and educating the workforce, (2) reducing healthcare costs, (3) prioritizing existing business needs (especially for small businesses and in rural areas), and (4) emphasizing and promoting lean manufacturing and its connection to the area universities.

Table IV.4. What can be done to remain competitive?

Suggestions	Percent cited (%)	Suggestions	Percent cited (%)
Improving education and educating workforce	11.69	Taking advantage of NAFTA to sell there	1.30
Reduce the healthcare cost	6.49	Eliminating middle man/buying your own	1.30
Prioritizing existing business needs (small & rural areas)	6.49	Promoting college education	1.30
Lean manufacturing-university connection	6.49	Being competitive in labor insurance and utilities	1.30
Addressing workforce skills/work ethic	6.49	Hazardous material shipping regulations	1.30
Diversifying products and economy	5.19	Connect local suppliers to customers	1.30
Becoming/making your business more competitive	5.19	Ease of getting through state red tape	1.30
Legislation that levels the playing field with NAFTA and China	5.19	Municipal waste water treatment facility	1.30
One stop regional workforce training and business centers	5.19	National level focus on competitiveness and education	1.30
Cutting the corporate taxes/ personal tax on unassembled equipment	3.90	Utility cost must be addressed for small businesses to remain competitive	1.30
Set up a "non-traditional technical school"	3.90	We need to have an energy policy	1.30
Make workers comp small business friendly	2.60	Revamping incentive package to accommodate small businesses	1.30
Empowering employees & leveraging their creativity	2.60	Leadership should take advantage of available federal money for	1.30
Expanding the highway	2.60	*workforce development*	
Improving community support for businesses	2.60	*existing industry retention programs*	
Cooperation across the counties/regional focus	2.60	*lean manufacturing*	
Encourage existing businesses to invest in the area	2.60	Bring research and testing labs to the area	1.30
reward integrated business systems with tax incentives			

MTSU Interview Results

IV.5.g. Future/Potential Industry Clusters

Business and community leaders identified distillery, winery, tourism, and retirement development as potential clusters in the MTM region. The second and third clusters are aerospace and defense as well as automotive and its suppliers. The fourth cluster is identified as R&D-based high technology and alternative energy. Table IV.5 below presents future industrial clusters in the MTM region.

Table IV.5. Future Clusters/Potential

Clusters	Percent (%)
Distillery/Winery/ Tourism/ Retirement	21.52
Aerospace & Defense	15.19
Automotive and Automotive Suppliers	15.19
R&D Based High Technology Clusters	10.13
Alternative Energy/Biofuel	8.86
Food & Poultry Processing	7.59
Call Centers/Distribution/Warehousing	5.06
Medical Supply/Pharmaceutical Support	5.06
Plastics	3.80
Material Sciences	2.53
Machinery Manufacturing	2.53
Writing Instruments	2.53

MTSU Interview Results

What Is in the Future? An overwhelming number of business and community leaders indicated that the MTM region has potential for growth. However, they indicated there will be further decline in the traditional manufacturing sector.

Similarly, many of them see the MTM region as a great place for businesses to start and grow as well as raising a family. The downside is, according to these leaders, that existing businesses feel that if things continue as they are now, these companies may not be in business in the near future.

Every statement about the MTM region's strength comes with qualification. For example, business and community leaders see the MTM region as strategically located to grow and attract new businesses provided that issues such as industrial sites and workforce education are properly addressed.

With respect to the manufacturing sector itself, community leaders argue that the MTM region cannot afford to lose its manufacturing capabilities. Community and government, they argue, should realize that losing manufacturing ability will decrease the MTM region's quality of life and standard of living.

There is overwhelming support for regional-level focus on future growth in the MTM region. Community and business leaders point out the necessity that the MTM region should carefully decide what kinds of clusters they will attract given the available resources.

Given the past experiences of some counties in the region, an overwhelming number of people we interviewed highlight the necessity to diversify the regional economy. These leaders believe that growth will come from technology and innovation in which existing businesses will play a critical role. When it comes to innovation and technology, community leaders call for extensive cooperation between Arnold Engineering and the Huntsville defense industry. They believe an effective synergy between these two locations will create significant spillover effects on rural economies.

A few other areas also deserve attention: (1) local stakeholders want TVA to be more cooperative in rural areas; (2) entrepreneurship and small businesses are seen as the engine of growth, requiring a strong policy emphasis on these areas; and (3) stakeholders argue that economic development strategies should be focusing on a broader range of measures to encourage an "integrated plant system in the MTM region" rather than "branch operations" for sustainable economic growth.

Future Challenges. Of course, many stakeholders believe that the MTM region will face some critical challenges as its economy continues to transform itself. Table IV.6 below ranks those challenges. Workforce in the region has emerged as a critical challenge that needs to be addressed, according to local stakeholders. Local education and resistance to technical education ranks second. Although community leaders agree on the necessity of regional-level economic development strategy, they believe that bringing communities together around a common goal to promote economic development would be big challenge.

Table IV.6. Future Challenges

Challenge	Percent cited (%)	Challenge	Percent cited (%)
Improving all aspects of workforce	19.47	Diversification	2.65
Local education/resistance to tech education	8.85	Water availability/treatment	2.65
Bringing communities together around a common goal	7.08	Thinking and acting regionally	2.65
Foreign competition	6.19	Addressing energy cost	1.77
Infrastructure in rural areas/funding	4.42	Price increase	1.77
Open mindedness/cooperation among leaders	4.42	Lack of incentives for rural areas/small businesses	1.77
Shipping/transportation	4.42	Training programs for welding, injection molding and other technical areas	1.77
Highway/4-lane access	3.54	Airport access	0.88
Healthcare	3.54	Technical resources	0.88
Red tape/regulations	3.54	Regional emphasis on education, workforce, highway	0.88
Leadership in promoting and selling the region by leveraging exiting industries	3.54	Increasing efficiency in water and energy use	0.88
Broadband access	2.65	Preparing workforce for potential technical skill shortages due to baby boomers	0.88
Heavy reliance on automotive	2.65	Advance manufacturing development programs are critical	0.88
Lack of R&D supported by universities	2.65		
Workers comp	2.65		

MTSU Interview Results

IV.5.h. State of Regional Business Interactions

Business-to-Business Interactions. Nearly one-third of businesses and community leaders rated the business-to-business interactions below average; less than 17 percent rated them above average; and 27 percent believe more needs to be done in this area (Table IV.7).

Table.IV.7. What is the state of business to business interaction in the region?

Categories	Percent cited (%)
Little/No Interaction	18.75
Not Good	14.58
Average	10.42
Above Average	16.67
Could be better	27.08
HR Directors and Plant Managers Meeting	12.50

MTSU Interview Results

Many stakeholders argue that they need to foster a healthy regional business environment, regionalism itself, and regional workforce development. To do this, regional business expos and synergy must be encouraged, according to these leaders. Especially, they call for a better synergy at the regional level between businesses, industrial boards, chambers, educational institutions, and government.

Local businesses argue that local chambers and mayors need to know their communities better, calling them to visit businesses more often. In terms of local business interactions, community stakeholders argue that business relationships with outside business associations are better than with area businesses. As reasons for this, they cite a set of factors: (1) social organizations are not in the region, (2) some companies are more detached from the community, (3) management of companies is not living in the area, (4) community business culture is not strong, (5) some businesses do not want to interact with each other, and (6) businesses are not cooperating with each other.

To overcome some of these issues, local stakeholders argue that the MTM region should encourage regional level networking for businesses, as networking is critical for business success. As a starting point, businesses should come together around a single issue such as education. Lean manufacturing is also another area in which businesses may pool resources to make a difference in the region. Furthermore, small businesses need to come together to seek solutions to problems that are common to all of them.

Business-to-Education Interactions. Overall, business and community leaders indicate a positive interaction with schools. However, they continue to maintain that education is a sore point in the MTM region. They believe that the MTM region could benefit from new educational opportunities. These leaders also indicate that small businesses do not have the desired level of close interaction with area schools. Table IV.8 tabulates responses from the region.

Table IV.8. Business to Education Relationships

Categories	Percent cited (%)
Business to vocational school is good	3.33
Businesses done a good job in cooperating with educational institutions	43.33
There are close contacts with technology centers	13.33
Community college is doing good at training	6.67
Could be better	16.67
Limited/no interaction	16.67

MTSU Interview Results

This overall positive response to business-to-school interaction, however, comes with qualifications: (1) willingness to help exists, but ability to deliver is below

average; (2) business demand for a skilled workforce is unmet; (3) business to high school interaction is not good (nearly one-third of businesses mentioned this); (4) existing training institutions and schools are not flexible enough to handle short-term business needs; (5) when it comes to improvements in education, we see just lip service; and (6) educational institutions are not showing their leadership proactively.

Many community leaders cited needs for an effective business-to-education partnership to reinvigorate their economies: (1) the need for formal internship programs and (2) the need for nontraditional schooling to meet short-term business demand (many businesses argue that community colleges are not flexible enough to change programs to accommodate business needs; area technical schools are performing below average in terms of business responsiveness; and as a sense of urgency for nontraditional schooling emerges, business leaders argue that schools in the region listen very well but do not resolve issues quickly enough). and (3) the need for reinventing themselves when it comes to education. To do this, more technical training and hands-on experience must be the case with material science. Furthermore, the MTM region needs to harness existing resources such as MTSU, UT, and area community colleges.

Promoting Business Interests. We also asked community stakeholders' opinions about various layers of leadership in terms of promoting their business interests. Table IV.9 provides a snapshot of what they think about local, state, and federal representatives.

Compared to state and federal representation, local officials and business associations receive relatively favorable opinions in terms of their efforts to promote their communities' interests.

Table IV.9. Are governments and associations promoting your interests?

Local government and association	
Not doing a good job	42.42
Yes	33.33
Could be better	24.24
State	
Not doing a good job	46.43
Yes	39.29
Could be better	14.29
Federal	
Not doing a good job	61.90
Yes	19.05
Could be better	19.05

Businesses have a wide range of concerns regarding local, state, and federal representatives: (1) some businesses complain about the lack of interest in what they are doing in their communities, arguing that government needs to listen to businesses and recognize the fact that there are solid businesses and good citizens in these communities; (2) many businesses complained that local leadership is not unified, arguing they first need to take care of our own house before blaming state and federal representatives; and (3) some businesses strongly argue that leadership at the state and federal level is not listening to local businesses and does not recognize the real issues they are facing in the region.

There is a strong sentiment among area businesses that local associations are neglecting existing businesses at the expense of recruiting new ones. They also complain that local governments do not handle the concerns of small businesses. On the issue of regionalism, businesses argue they should start thinking regionally and motivate leadership to do the same.

In terms of the state's role in the region, some stakeholders want state economic development officials to listen to rural communities. They believe the state expects too much from rural communities.

In terms of national representation, many local stakeholders feel that there is a disconnect between national representation and rural communities.

IV.5.i.Expectations from This Initiative

We also asked community stakeholders their expectations from this initiative. Table IV.10 ranks their expectations in order of importance. Three prominent ones are a regional level forum, access to information about the region, and attracting better-paying jobs. We must emphasize that each expectation in this list provides an important clue for economic development officials in revitalizing the MTM region.

Table IV.10. What would you like to see out of this initiative?

1. A Regional level forum	18. R&D labs and testing centers
2. Access to information about our region	19. Synergy and leadership
3. Attracting better paying jobs	20. Water and environmental issues
4. Competitiveness	21. Community should know what business assets they have
5. Concrete recommendations regarding the problems	22. Efforts to bring companies together in the areas of pressing needs
6. Economic diversity	23. Eliminate or reduce taxes to make industry more competitive
7. Road maps for the future	24. Improve the highway and other rural infrastructure
8. High-paying job creation	25. Set-up a long term vision for regional economic development
9. Emphasis on education and business connection	26. Which companies are buying from whom?
10. Ways to empower this group to produce something tangible	27. Who are the major entities in the region?
11. Encourage skilled labor development/evaluate this issue critically	28. Explore workers comp and its implications for small businesses
12. Focus on existing business/find ways to make them competitive	29. Addressing a whole issue of utility costs
13. Identify some companies suitable for region	30. Regional level one-stop business centers
14. Highway and tax incentives for rural areas	31. Networking opportunities
15. Industry-cluster gaps/list of industries	32. Modify existing incentive packages for small businesses
16. List of recommendations with details	33. Directions about the factors affecting healthy business environment
17. Marketing the region with data	34. Web of entities working together

IV.6. REGIONAL STAKEHOLDER SURVEYS: SURVEY-BASED INDUSTRY CLUSTERS AND ASSESSMENT OF FACTOR CONDITIONS IN THE MTM REGION

IV.6.a. Overview

In an effort to better understand industrial clusters, regional strengths and weaknesses, factor conditions, regional and industry risk factors, and a host of other business related issues, the BERC designed a comprehensive survey. Business surveys and interviews should be considered together, as both documents deal with similar issues in two different formats: interviews reflect responses to open ended-questions, while surveys were very much structured around certain topics.

Our primary goals in this part were (1) to obtain survey-based estimates of regional industrial clusters along with their backward and forward linkages; (2) to assess regional strengths, weaknesses, global threats, and opportunities; (3) to evaluate the state of factor conditions as perceived by regional stakeholders; (4) to shed light on regional and industrial risk factors; and (5) to capture any other business dynamics that hamper or promote a healthy business environment in the MTM region.

IV.6.b. Methodology

The business survey procedure includes the following steps. Initially, 123 businesses and 28 local officials were indentified. Surveys were mailed to all businesses, and follow-up calls were made to all survey recipients. Due to low response rates from the first stage, we initiated a second round of mailing and e-mailing surveys to the 80 businesses and officials. Finally30 surveys were returned, of which 21 were from businesses and nine (9) from local officials. All counties except Moore were represented in the survey. Although the response rate was about 20 percent, we nevertheless gained important insights into industrial cluster dynamics and other business issues in the MTM region.

IV.6.c. Survey-Based Clusters: Their Suppliers, Customers, and Related Industries

Clusters and Their Suppliers. The business survey identified 15 clusters in the MTM region. Given the responses to the survey, suppliers of many of these clusters have a strong presence in other states. As shown in Table IV.11 below, the Nashville MSA also is important supplier base for the MTM region's clusters. Ideally, the MTM region may prefer that those suppliers located in other states relocate to the MTM region. Given the increase in transportation cost, this strategy may strengthen the supply-chain of the area cluster by cutting costs in addition to the employment benefits of relocating supplier industries to the MTM region.

Table.IV.11.Regional Clusters and Their Suppliers

Clusters	Supplier Industries	Region	MSA	Rest of Tennessee	Other States	Other Countries
Petroleum and Gas				Weak	Medium	
Chemical-Based	Chemicals +carbon, coal +metal+paint+machine	Weak	Weak	Medium	Medium	Strong
Metalworking and Fabricated Metal	Aliminum products+ bolt-steel+paint+brass	Weak	Strong	Medium	Medium	
Nondurable Industry Machinery	Steel manufacturing	Weak	Weak	Weak	Weak	
Machine Tools	Textile+ steel+paint+plastics+paperboard	Weak	Strong		Strong	
Motor Vehicle	Steel manufacturing+paint+plastics+fasteners	Medium	Medium		Medium	
Textile and Apparel	Textile +packaging+carpet	Strong			Strong	
Business Services	Pen and pencil+chemical	Medium	Weak		Medium	
Nonresidential Building Products	Chemicals	Strong	Strong	Weak	Strong	
Writing Instruments	Plastics +pen			Strong	Strong	
Food Processing	Poultry +Agricultural systems		Strong			
Paper, Publishing and Printing		Weak	Weak	Weak	Strong	
Plastics	Plastics and resin+raw plastics	Weak	Weak	Weak	Strong	
Wood Prodcessing	Sawmill	Strong				
Wholesale	Aliminum products	Weak	Weak	Weak	Strong	

MTSU Survey

Clusters and Their Customer Industries. Table IV.12 below shows the location of customer industries of the MTM region's clusters. Many of the 15 clusters indicate that their customer industries are outside Tennessee. This large presence of out-of-state customer industries is a plus for the MTM region because the MTM region is exporting goods and services.

Table.IV.12. Survey-Based Clusters and Their Customers

Clusters	Customer Industries	Region	MSA	Rest of Tennessee	Other States	Other Countries
Petroleum and Gas	Municipalities+federal companies			Weak	Strong	
Chemical-Based	Mining+pharmaceutical companies+iron making+chemical+demolition+chemical manufacturing+alloy smelting+department of defense+oil field	Weak		Weak	Strong	Strong
Metalworking and Fabricated Metal	Plastics+appliance industries+engineering company+minerals+grill industries+waste treatment		Medium	Medium	Medium	
Nondurable Industry Machinery	Auto+building suppliers+mechanic fabrication	Weak	Weak	Weak	Medium	
Machine Tools	Miscellenous manufacturing					
Motor Vehicle	Auto		Medium		Strong	
Textile and Apparel	Education+auto				Strong	
Business Services	Auto	Medium	Weak		Medium	
Nonresidential Building Products	Existing businesses	Strong			Strong	
Writing Instruments	Walmart+other retailers					
Food Processing	Walmart					
Paper, Publishing and Printing					Strong	
Plastics	Home manufacturers+building supplies				Strong	
Wood Prodcessing	Furniture stores+home centers+other locals	Strong		Weak	Medium	
Wholesale	Aliminum+auto	Medium		Weak	Weak	

Clusters and Related Industries. Related industries here are defined as industries producing similar goods and services.[2] As highlighted in Table IV.13, related industries in the MTM region have primarily the same technology, share the same labor pool and common suppliers, and produce the same goods. However, they do not have networking opportunities in the MTM region.

Table IV.13. Whether or not the related industries have the following features?

Common Features	Yes	No
Same Technology	73.91	26.09
Same Labor Pool	59.09	40.91
Have Common Suppliers	90.91	9.09
Produce the Same Goods	80.95	19.05
Networking Opportunities	44.00	56.00

MTSU Survey (N=25)

Clusters and Common Problems. We asked local businesses to identify their most common problems in the MTM region. Table IV.14 ranks the problem areas in the order of importance. As is clear from the table, labor issues top the list. Labor-related issues constitute nearly 35 percent of all listed concerns. The next three concerns are primarily tied to the national economic environment: foreign competition, raw material price, and the general economy (oil and steel prices).

[2] To avoid confusion, the concept of related industries here corresponds to "rival industries" in Porter's (1990) methodology. "Related industries" in Porter (1990) refer to "enabling industries," such as professional services, business and finance, information services, R&D, etc., defined earlier in this study.

Table.IV.14. Most Common Problems Faced in the Region	Frequency	Percent
Quality and Quantity of Labor	8	16.33
Foreign Competition	6	12.24
Raw Material Price	5	10.20
General Economy--Oil and Steel Prices	4	8.16
Skilled Workforce	4	8.16
Compliance Costs Associated with Government Regulations	3	6.12
Low Profitability	3	6.12
Retaining Employees	2	4.08
Funding	1	2.04
Labor Cost	1	2.04
Land Availability/Bio Security	1	2.04
Loss of Manufacturing Jobs	1	2.04
Loss of Market	1	2.04
Price Pressure from all Customers in Automative	1	2.04
Seasonal Volume	1	2.04
Clients	1	2.04
Declining Availability of Materials	1	2.04
Diminishing Technically Skilled Employee Base	1	2.04
Employee Soft Skill	1	2.04
Lack of 4-Lane Highway	1	2.04
Labor Force Lack Basic Math and Reading Skills	1	2.04
Technical Resources	1	2.04
When all Labor Issues Combined	***17***	***34.69***

MTSU Survey

Clusters and Critical Support Institutions. As Table IV.15 shows, community colleges and technology centers emerge as critical support institutions for clusters in the MTM region. Next in the list are economic development boards, area universities, and government. Overall, 68 percent of the survey respondents are content with the services they receive from these support institutions.

Table.IV.15. What are the critical support institutions for your business?

Institutions	Frequency	Percent
Community Colleges and Techology Centers	9	24.32
Economic Development Boards	5	13.51
Area Universities	4	10.81
Government (State/Federal)	4	10.81
Financial Institutions	3	8.11
Aechitectural and Engineering Firms	2	5.41
Skill Trade Institutions	2	5.41
Utilities	2	5.41
Recycling Centers	1	2.70
Steel Suppliers	1	2.70
R&D Labs other than Federal	1	2.70
Rail Road Lines	1	2.70
Technical Contractors	1	2.70
Tennessee Egg Poultry Association	1	2.70
Are Existing Support Institutions Able to Meet Your Business Needs?		
Yes (%)	68.18	
No (%)	31.82	

MTSU Survey

Clusters and Desired Institutions. What kinds of institutions would you like to see in the region? Although more than two-thirds of respondents indicated that overall they are content with the services they receive from support institutions (see Table IV.15), 31 percent would like to see "other training institutions" and another 23 percent a "higher education institution." Table IV.16 presents the ranking of desired institutions in the MTM region.

Table.IV.16. What Kinds of Institutions You Would Like to See in the Region?

Institutions	Frequency	Percent
Other Training Institutions	8	30.77
Higher education	6	23.08
Economic Development Agency	6	23.08
Other (engineering, trade association, consulting)	3	11.54
R&D Labs Other than Federal	2	7.69
Financial Institutions	1	3.85

MTSU Survey

IV.6.d. Regional Strengths and Weaknesses and Global Opportunities and Threats

In this section we asked three separate questions: what are the strengths, weaknesses, opportunities, and threats (S.W.O.T) for (1) your business, (2) your supplier businesses, and (3) customer businesses?

S.W.O.T. for Businesses. Table IV.17 provides a detailed ranking of responses for each S.W.O.T category. Highlights from the table are that "location" is considered a major strength, and "labor pool" with necessary soft and basic skills is cited as a major weakness. While fuel and transportation costs emerge as major global threats, economy/export opportunities present themselves as global opportunities.

Table.IV.17. Regional Strengths and Weaknesses and Global Opportunities and Threats for Businesses

Regional Strenghts	Percent	Regional Weaknesses	Percent
Geographic Location/Logistics	19.44	Labor Pool (Basic Skill/Soft Skill)	20.00
Motivated and Stable Workforce	8.33	Lack of Skilled Workforce	14.29
Technology/Automation	8.33	Economy/Energy-Material Cost	11.43
Available and Strong Labor	5.56	Highway Access/Location	5.71
High Level of Personification	5.56	Loss of Demand	5.71
Knowledge of Product	5.56	Rising Health Care/ WC	5.71
Low Labor Cost	5.56	High Cost of Government Compliance	5.71
Support Networks	5.56	Out of Touch Business Officials	2.86
Highest Quality Environment	5.56	Committed Employees	2.86
Quality/Timely Delivery	5.56	Education K-12	2.86
Local Economy	2.78	Lack of Projects	2.86
Established Reputation	2.78	Lack of Testing Labs	2.86
Management	2.78	Limited Fright Services	2.86
Teamwork Philosophy	2.78	Loss of Jobs	2.86
Clean Manufacturing Products	2.78	Bio Security	2.86
Customer Support	2.78	Cost Control	2.86
Good Working Relations	2.78	Lack of Funding	2.86
Low Taxes	2.78	Lack of Steel Supply	2.86
Small Town Life Style	2.78		

Global Threats	Percent	Global Opportunities	Percent
Increased Fuel/Transportation Cost	22.22	Economy/Export Opportunities	11.76
Cheap Labor in Other Countries/China	14.81	Location/Local Transportation	11.76
Overseas Competition	14.81	New/Increased Customer Bases	11.76
Economy/Weak Dollar	11.11	Technology/Lincense	11.76
Loss of Jobs to Overseas	11.11	New Unique Products	11.76
Branch Operations	3.70	Emerging Markets in China	5.88
New Regulations	3.70	Joint Ventures	5.88
Offshore Production	3.70	Mixed Model Production	5.88
Steel Supply	3.70	New Auto Assembly Plants	5.88
Urban Development	3.70	R&D in the U.S.	5.88
Less Environmental Compliance Cost	3.70	Alternative Energy	5.88
Supplier Base	3.70	Regional Cooperation	5.88

S.W.O.T. for Supplier and Customer Industries. According to Table.IV.18, major strengths for supplier and customer industries are "access to highway" and "consistent demand," respectively.

Major weaknesses for supplier and customer industries are cited as "fewer domestic resources" and "regulations/compliance cost," respectively.

While low-cost labor overseas and lack of alternative energy emerge as major threats to suppliers and customer industries, respectively, innovation and globalization are seen major opportunities.

Table.IV.18: Regional Strengths and Weaknesses and Global Opportunities and Threats for Supplier and Customer Industries

Regional Strenghts for Supplier and Customer Industries	
For Suppliers	For Customers
Access to Highway/Delivery Time	Consisten Demand
Enlarged Training Programs	More Aluminum Use
Excellent Road Network	Local Suppliers
Labor Cost	Location/Infrastructure
Proximity	Low Labor Cost
Support Netwroks	Product Delivery/Response Time
Technology Use/Automation	Retirees with Money
Quality of Products	Stable Environment
Working Relationships	Technology Use/Automation

Regional Weaknesses for Supplier and Customer Industries	
For Suppliers	For Customers
Fewer Domestic Resources	Regulations/Compliance Cost
Lack of Funding/Projects	Location/Logistics
Overseas Competition/Production	Lack of Steel Supply
Rising Raw Material Costs	Lack of Projects
Uneven Demand	Outdated Equipment
Regulations/Compliance Cost	Prices
Lack of Steel Supply	Transportation Cost for All
Location/Logistics	Subtandard Work Ethic
Material/Labor	Entitlement Mentality among Many

Global Threats for Supplier and Customer Industries	
For Suppliers	For Customers
Low Cost Labor	Alternative Technology
Steel Supply	Steel Supply
Oil Prices	Low Labor Cost
Less Environmental Compliance Cost	Cheap Overseas Products
Supplier Base	Loss of Foreign Production
	Less Environmental Compliance Cost
	Oil Prices

Global Opportunities for Supplier and Customer Industries	
For Suppliers	For Customers
Innovation	Globalization/Rationalization
Outsourcing Work	Improved Logistics
R&D in the U.S.	Increasing Exports
Local Transport	Labor Base
More Automative Choosing	Partnering
	Off-shore Purchase
	Selection of Product
	Develop Nich Markets
	R&D Professional Development

MTSU Survey

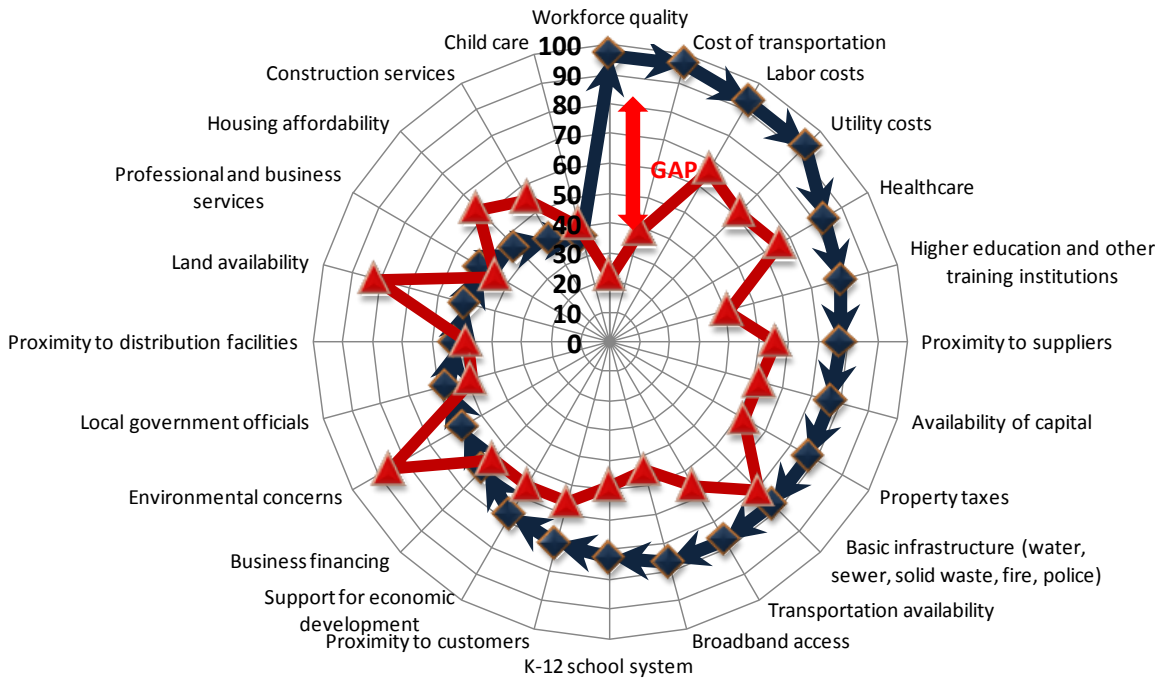
IV.6.e. Factor Conditions

In this section, we asked local businesses to evaluate factor conditions in the MTM region. For each factor, local businesses rated the factor for its significance to their businesses and then assessed whether the MTM region is performing well in supplying that factor.

Importance of Factors for Businesses. Chart IV.4 below presents a combined view of the importance of factors for businesses versus performance of the MTM region in adequately supplying that factor. The chart turns clockwise and starts with

factors that are critically important for businesses but undersupplied in the MTM region.

Chart IV.4: Regional Factor Conditions: Gap Between Business Needs and Local Performance



Gap between Importance for Businesses and Performance of the MTM Region. Table IV.19 shows the extent of the gap between the factor's importance for businesses and the region's performance in supplying those factors. A glance at the table indicates that "workforce quality" is one area that requires significant regional attention. A nearly 75 percentage-point gap suggests that "workforce quality" is considered very critical for businesses but the MTM region's performance in supplying quality labor is very low. Other critical gaps between business needs and the region's performance exist in the areas of "cost of transportation," "higher education and other training institutions," "broadband access," "utility cost," "labor costs," "availability of capital," and "K-12 school system."

Table IV.19. Factors Important for Your Business Success in the Region	GAP (Region's Performance-Business Needs)	Gap Level
Workforce quality	-74.5	Critical Gap Between Business Needs and Region's Performance
Cost of transportation	-58.2	
Higher education and other training institutions	-39.3	
Broadband access	-32.2	
Utility costs	-31.6	
Labor costs	-26.7	
Availability of capital	-24.9	
Property taxes	-24.9	
K-12 school system	-24.3	
Proximity to suppliers	-21.2	Moderate Gap Between Business Needs and Region's Performance
Transportation availability	-21.1	
Healthcare	-17.4	
Proximity to customers	-14.5	
Support for economic development	-11.2	
Local government officials	-8.5	
Basic infrastructure (water, sewer, solid waste, fire, police)	-6.4	
Professional and business services	-5.6	
Business financing	-4.5	
Proximity to distribution facilities	-3.6	
Child care	4	Region Outperforms Business Expectations
Construction services	15.5	
Housing affordability	18.1	
Environmental concerns	28.5	
Land availability	31.4	

MTSU Survey (sum of excellent + good - sum of very important + moderately Important)

Comparing with National Surveys. Table IV.20 compares regional and national factor rankings. In order to match factors in the MTSU survey with those of an annual corporate survey, we included only the top 15 factors. As the table demonstrates, the top four (4) factors that are important for corporate site selection show similarities to the top four (4) factors that are important for MTM regional businesses. The last two columns of the table indicate the MTM region's level of readiness for a given factor. One important conclusion from this analysis is that in order to attract businesses to the MTM region, community stakeholders should pay close attention to the top four factors listed here.

Table.IV.20: Local Factors Important for Businesses and Level of Local Preparedness

National Corporate Survey*			Local Business Survey**				
Top 15 Factors Important for Site Slection			Top 15 Factors Important for Businesses			Level of Local Readiness	
Factors	Score (%)***	Rank	Factors	Score (%)***	Rank	Score (%)****	Gap*****
Highway Accessibility	96.9	1	Workforce quality	96.7	1	22.2	**-74.5**
Labor Costs	92.3	2	Cost of transportation	96.6	2	38.4	**-58.2**
Energy Availability and Costs	89.0	3	Labor costs	93.3	3	66.6	***-26.7***
Availability of Skilled Labor	88.7	4	Utility costs	93.1	4	61.5	**-31.6**
Occupancy or Construction Costs	88.2	5	Healthcare	82.8	5	65.4	-17.4
Available Land	85.4	6	Higher education and other training institutions	80.0	6	40.7	**-39.3**
Corporate Tax Rate	83.8	7	Basic infrastructure (water, sewer, solid waste, fire, police)	76.7	7	70.3	-6.4
State & Local Incentives	83.4	8	Availability of capital	76.7	8	51.8	***-24.9***
Environmental Regulations	83.2	9	Proximity to suppliers	76.7	9	55.5	***-21.2***
Tax Exemptions	82.8	10	Property taxes	76.7	10	51.8	***-24.9***
Proximity to Major Markets	82.8	11	Transportation availability	76.6	11	55.5	***-21.1***
Availability of Advanced ICT Services	82.2	12	Broadband access	76.6	12	44.4	**-32.2**
Low Union Profile	80.6	13	K-12 school system	72.4	13	48.1	***-24.3***
Availability of Buildings	79.3	14	Proximity to customers	70.0	14	55.5	-14.5
Right-to-Work State	72.1	15	Support for economic development	66.7	15	55.5	-11.2

*The 22nd Annual Corporate Survey & the 4th Annual Consultants Survey (2007)

**BERC Local Business Survey (2008) for Target Industry Analysis

***Score indicates the sum of the percent of those saying "very important" and "important"

****Score indicates the sum of the percent of those saying "Excellent" and "good"

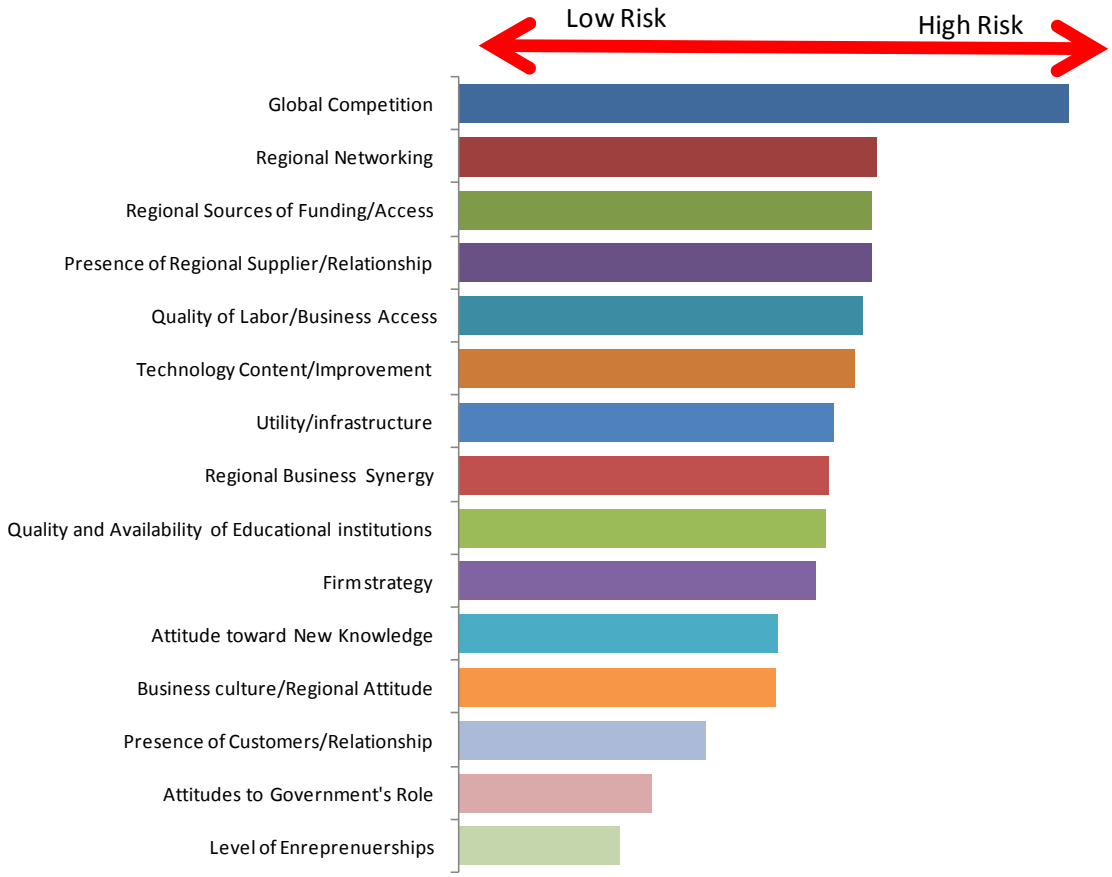
*****Gap is the difference between "local readiness in a given factor" and "importance of that given factor for businesses"

IV.6.f. Business Attitude Survey: Regional and Industrial Risk Factors

In this section, we asked local businesses whether they agree or disagree with 44 statements organized under 15 categories ranging from globalization, workforce quality, and firm strategy to knowledge. The purpose is to assess regional and industrial risk factors by analyzing how local businesses are responding to a variety of challenges and trends to make their businesses and the region more competitive.

Figure IV.1 below provides an aggregate view of the risk factors for the region and its industries. Tables IV.21-23 present detailed statements. As seen in Figure IV.1, global competition, regional networking, regional sources of funding/access, presence of regional suppliers/relationship, and quality of labor/business access are the greatest risk factors to regional competitiveness.

Figure IV.1: Business and Regional Economic Environment: Risk Factors to Competitive Businesses and Region



Knowledge, Labor, Networking, Suppliers, and Demand. As indicated in Table IV.21, access to skilled labor, regional networking opportunities, and lack of regional suppliers are seen as greater concerns by local businesses. In terms of the labor dimension, many businesses indicated that there is competition for skilled workers in the region. Similarly, they strongly agree with the statement that "labor is plentiful in the region but not skilled labor." Under the supplier relationship, businesses indicated that their suppliers are facing competitive pressures.

Table IV.21. Business Attitude Survey: Knowledge, Labor, Networking, Suppliers and Customers

Knowledge Dimension		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Q1KD	Our business is sensitive to innovation in production technologies	34.5	17.2	34.5	10.3	3.4
Q2KD	Our employees are continously trained to update their knowledge about our business	10.7	35.7	32.1	21.4	0.0
Q3KD	Our business adapts fast to changing business environment	10.7	50.0	25.0	10.7	3.6
Labor Dimension						
Q4LD	We have access to skilled labor force in the region	6.7	16.7	30.0	33.3	13.3
Q5LD	Our business is skill intensive	21.4	32.1	28.6	17.9	0.0
Q6LD	There is a competition for skilled labor force among employers	30.0	36.7	23.3	10.0	0.0
Q7LD	Labor is plentiful in the region but not the skilled one	27.6	24.1	24.1	13.8	10.3
Networking						
Q8N	Networking opportunities among similar firms are available in the region	13.8	31.0	13.8	31.0	10.3
Q9N	The region has instituions to facilitate networking among businesses	7.1	25.0	50.0	14.3	3.6
Supplier relationships						
Q10S	Our suppliers are from the region	0.0	21.4	53.6	3.6	21.4
Q11S	We work closely with our suppliers	40.7	40.7	7.4	7.4	3.7
Q12S	Our suppliers are facing competitive pressure	51.9	33.3	7.4	3.7	3.7
Demand relationships						
Q13D	Our customers are other businesses and institutions	50.0	28.6	10.7	7.1	3.6
Q14D	Our customers are within the region	17.9	21.4	21.4	21.4	17.9
Q15D	Our customer base is shifting their purchasing pattern	14.8	37.0	22.2	25.9	0.0

Entrepreneurship, Technology, Regional Focus, and Firm Strategy. Table IV.22 highlights the presence of an entrepreneurship culture in the MTM region. However, technology and workforce adaptation of new technology look problematic.

Table IV.22. Business Attitude Survey: Enreprenuerships, Technology, Regional Focus and Firm Strategy

Enreprenuerships		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Q16E	We closely follow market demand for our products	53.6	32.1	7.1	7.1	0.0
Q17E	We respond quickly to the change in customer taste	28.6	57.1	7.1	3.6	3.6
Q18E	We design and test new products as a product improvement strategy	38.5	19.2	23.1	15.4	3.8
Technology						
Q19T	Our business uses the cutting-edge technology	14.3	14.3	53.6	10.7	7.1
Q20T	Our business is technology intensive	14.3	25.0	28.6	14.3	17.9
Q21T	Broadband access is available in the region	27.6	27.6	27.6	3.4	13.8
Q22T	Our business is on par with the industry standard in adopting new technology	14.3	53.6	17.9	14.3	0.0
Q23T	The region has skilled workforce to adapt new technologies	10.3	6.9	31.0	34.5	17.2
Regional focus						
Q24RF	We have several firms in the region which share the labor force with similar skills	24.1	13.8	37.9	17.2	6.9
Q25RF	We have several firms in the region which share the same customer base	10.3	13.8	37.9	24.1	13.8
Q26RF	We have several firms in the region which use similar production technologies	17.2	24.1	24.1	20.7	13.8
Q27RF	We have several firms in the region which have the same suppliers	10.3	34.5	24.1	17.2	13.8
Q28RF	The region is in need of industrywide support for competitiveness	16.7	23.3	56.7	3.3	0.0
Q29RF	The region is in need of firm-level support for competitiveness	3.4	31.0	55.2	10.3	0.0
Firm strategy						
Q30FS	Our business values regional competition and cooperation	6.7	43.3	36.7	10.0	3.3
Q31FS	We put aside research and development money to invest in new products	19.2	26.9	30.8	11.5	11.5
Q32FS	We continuoisly reevaluate our management style	25.0	21.4	32.1	14.3	7.1

Government, Globalization, Business Culture, Education, Money, and Utility/Infrastructure. Businesses do not see government support as a preferred

attitude; however, they would like to see incentives from government to improve the business environment. Global competition is seen as a challenge. Regional financial and physical infrastructure need to be addressed (Table IV.23).

Table IV.23. Business Attitude Survey: Government, Globalization, Business Culture, Educational Institutions, Money and Utility/Infrastructure

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Government						
Q33G	Our business needs government support to remain competitive	14.3	14.3	14.3	25.0	32.1
Q34G	We need state and local incentives to improve our business environment	24.1	24.1	17.2	20.7	13.8
Globalization						
Q35GZ	Our business benefits from increasing international competition	3.4	6.9	20.7	37.9	31.0
Business culture						
Q36BC	The region has a business friendly environment	20.0	26.7	33.3	20.0	0.0
Q37BC	The people in the region have positive attitude toward businesses/ business formation	13.3	46.7	20.0	16.7	3.3
Educational institutions						
Q38BC	The region has a quality K-12 educational infrastructure	13.8	24.1	41.4	17.2	3.4
Q39BC	The region has quality post-secondary (universities, community colleges and other training institutes) educational institutions	13.8	41.4	31.0	10.3	3.4
Q40BC	Our business benefits from close interactions with local post-secondary educational institutions	20.7	24.1	24.1	24.1	6.9
Money						
Q41M	Our business has easy access to funding sources in the region	6.9	44.8	27.6	20.7	0.0
Q42M	Our business has easy access to funding sources outside the region	10.3	34.5	24.1	27.6	3.4
Q43M	Region has a plenty of funding sources for businesses	6.9	13.8	58.6	10.3	10.3
Utility/infrastructure						
Q44U	Our region is endowed with a qulity infrastructure (transportation, utility, etc.)	6.9	37.9	37.9	13.8	3.4

MTSU Survey

IV.6.g. Other Regional Issues

This section includes a set of questions that aims to capture other business dynamics in the region. Answers to these questions also serve as a roadmap for economic development and for elected officials trying to improve regional competitiveness.

Identifying Industries. Many businesses identify themselves as part of either existing or declining industry clusters (Table IV.24).

Table IV.24. How would you identify your industry?

Clusters	Existing	Declining	Emerging	Potential
Petroleum and Gas	Yes			
Chemical-Based	Yes	Yes		
Metalworking and Fabricated Metal		Yes	Yes	
Nondurable Industry Machinery	Yes			
Machine Tools		Yes		
Motor Vehicle	Yes			
Textile and Apparel	Yes			Yes
Business Services	Yes			
Nonresidential Building Products		Yes		
Writing Instruments	Yes			
Food Processing	Yes			
Paper, Publishing and Printing	Yes			
Plastics		Yes		
Wood Prodcessing		Yes		
Wholesale	Yes			

MTSU Survey

Cluster Connection. A significant number of industries identify themselves as part of the clusters located in the rest of Tennessee and outside the state (Table IV.25).

Table IV.25. Do You Characterize Yourself as Part of a Cluster Located in

Clusters	Region	Nashville MSA	Rest of TN	Outside State	N/A
Petroleum and Gas		yes			
Chemical-Based			yes	yes	yes
Metalworking and Fabricated Metal		yes	yes	yes	
Nondurable Industry Machinery			yes		
Machine Tools					yes
Motor Vehicle				yes	
Textile and Apparel				yes	
Business Services	yes				
Nonresidential Building Products					
Writing Instruments					
Food Processing					
Paper, Publishing and Printing					
Plastics					
Wood Prodcessing	yes				
Wholesale					

MTSU Survey

Cluster Linkages. Those industries identifying themselves as part of a value-chain cluster constitute 28 percent. About 60 percent of them identify themselves as part of a cluster sharing the same labor pool, while 12 percent identify as part of an innovation cluster (Table IV.26).

Table IV.26. Which of the following best describes your business's linkages to other similar industries in the region?

Linkages	Percent (%)
1. Member of a value-chain cluster (same extended product chain)	28
2. Member of a cluster that shares the same labor pool	60
3. Member of an innovation cluster	12

MTSU Survey

Technology Gap. More than three-fourths of businesses indicate that there is no technology gap between their firms' technology and their industries' standards. A little over 23 percent acknowledged that they are behind the industry standards in terms of technology (Table IV.27).

Table IV.27. Is there a gap between your firm's use of technology and your industry's standards? (%)

Yes	23.1
No	76.9

MTSU Survey

Strategic Interactions. What are the strategic business interactions you would like to see in the MTM region? Many businesses indicated that they want to see "higher education highly responsive to business needs." "Skilled labor pool" ranks second; and "R&D labs and technology centers" third (Table IV.28).

Table IV.28. What are the strategic business interactions you would like to see in the region? (ranked in the order of importance)

Highly Responsive Higher Education to the Business Needs
Skilled Labor Pool
R&D Labs and Technology Centers
Technical Training Facility That Supplies Skilled Labor Force
Experience Sharing
FMLA Reform
More Qualified Vendors
More Regional Planning on Economic Recruiting and Education
Productivity Improvement
Rural Development Strategy by TDECD
Approved Courses for Multiple State Licensing Boards
Health Care
K-12 Education Stimulation
More Cooperation among Contagious Counties
Stronger Relations with Local Governments/Political Leaders
Support for Tennessee Diploma Project & P-16 Councils
Workers Compensation Reform
Developing Technical Resources for the Future
National Program to Rebuild Failing Infrastructure

MTSU Survey

Factors Impeding a Healthy Business Environment. The three most important regional factors that impede a healthy business environment are cited as "lack of quality workforce," "lack of four-lane highway access and funding," and "K-12 education" (Table IV.29).

Table IV.29. What is the single most important regional factor that impedes a healthy business environment? (ranked in the order of importance)

Lack of Available Quality (Skilled) Workforce
Lack of 4-Lane Highway Access/ Federal and State Highway Funding
K-12 Education
Lack of Access to Suppliers and Customers
Cost
Lack of Solid Waste Treatment Facilities
FMLA/ Workers Compensation
Government Understanding of Business Competition
Labor Unions
Lack of Quality Production
Land
Supply Chain
Training of Skilled Workforce

MTSU Survey

Factors Promoting a Healthy Business Environment. When we asked what factors promote a healthy business environment, it is not surprising that we received almost identical answers. "Availability of quality workforce," "4-lane highway," and "motivated workforce with work ethic" top the list (Table IV.30).

Table IV.30. What is the single most important regional asset that promotes a healthy business climate? (ranked in the order of importance)

High Availability of Quality Workforce
4-Lane Highway/Federal-State Highway Fund
Motivated Workforce with Work Ethic
Business Opportunities
Centralized Customer Base
Cooperation in Workforce Development
Government Attitude toward Business
Local Government
Location/Labor Rates
More Doctors

MTSU Survey

Government's Effect on Businesses. How does government affect your business? On the positive side, government has a role that facilitates business interactions and provides help for human capital investments. On the negative side, regulations may drastically reduce productivity and profit margins. Many businesses highlighted the negative aspects (Table IV.31).

Table IV.31. How do government regulations, procedures, and incentives affect your business?

Positive	Negative
Government Funds Drive Quantity of Work	Air Regulations Affect Profitibality of Small Businesses
Have a Major Effect on Businesses (positive)	Add Costs
Helps Bring Industry to Industry Parties Together	Workers Compensation and FMLA
Positive	Makes the Process of Constructing New Facilities Cumbersome
Training/Education	Limit the Business Growths
	Negative
	Sarbanes Oxly Legislation has Created Nonsensical Busy Work
	Slow Implementation of Start-up Projects
	Taxing
	Controlling What We Do

MTSU Survey

Important Supporting Institutions. We asked businesses what kinds of support institutions they would like to see in the MTM region. Many businesses indicated they would like to see technical training and technology centers as well as testing labs. Furthermore, an equal number of businesses indicated they would like to see a four-year college branch campus (Table IV.32).

Table. IV.32. What are the most important regional institutions you desire to have present that are currently absent? (ranked in the order of importance)

Technical Training and Technology Centers
4-Year College/MTSU Campus
Testing Labs/R&D Labs/Educational
Trade/Vocational Schools
Local 2-Year College Training

MTSU Survey

Desirable Business Attitudes. What is the most important business attitude you would desire to see? To highlight a few, a recognition and understanding of business dynamics in rural regions, emphasis on rural economic development, and willingness to embrace change are types of attitudes local stakeholders would like to see (Table IV.33).

Table IV.33. What is the most important business attitude you would desire to see? (in no particular order)

Better Communication
Customer Service
Government's Recognition of the Impact of Spiriling Fuel and Steel Cost on Businesses Growth
Involvement and Support of Education
Less Emphasis on Labor Unions
Less Litigation
Local and State Governments Working Togetfor for Business Development
More Assistance to Existing Businesses that have been in Tennessee for a Long Time
More Attention to Rural Economic Development by State and Federal Government
Positive Acceptance of Business Challenges
Regionwide Infrastructure Plans
Understanding Competition
Willingness to Embrace Change

Advantages and Disadvantages of Doing Business in the MTM Region. We finally asked what are the advantages and disadvantages of doing business in the MTM region. We received limited response to this question. Those who answered cited good labor supply and skill, good quality of life for residents and employees, labor pool and location as major advantages. The answer to this question with respect to supply of labor force and skill is contradictory to the ones in earlier questions regarding labor force. This contradiction stems from several factors: (1) more people responded to the earlier questions; (2) businesses often compare their initial experience (when they first relocated to the region) with the recent hiring experience; and (3) many businesses value their current workforce as skilled and dedicated whereas they complain about the new hires in terms of their skill and work ethic.

In terms of disadvantages, many businesses cited regulatory environment, workers comp, lack of four-lane highway in rural areas, and lack of government assistance programs for existing businesses as disadvantages (Table IV.34).

Table IV.34. What are the major advantages or disadvantages when it comes to doing business in this region?

Advantages	Disadvantages
Good Labor Supply and Skill	Regulatory Bureaucracy
Good Quality of Life for Residents/Employees	Lack of 4-Lane Highway
Labor Pool	Must Improve Workers Comp
Local Assistance	Need a Regional Center for Industrial Training/Development
Low Cost of Property	Current Administration Needs to Recognize the Impact of TDOT Projects on Businesses
Location	Urban Sprawl
Increasing Technically Trained Workforce	High Medical Cost
Economic Development	Industrial Parks in Counties are Away from Highway
Transportation	Establish Enterprize Zones with Federal and State Tax Breaks
Favorable Regulatory Environment	FMLA
Fiber Optics Availability in Certain Counties	Multiple Level of Taxing Authorities
	Lack of Retails
	Government Assistance Programs for Existing Businesses
	Labor Pool

IV.7. MODEL-DRIVEN REGIONAL CLUSTERS AND THEIR ALIGNMENT WITH THE NATIONAL CLUSTER TEMPLATE

IV.7.a. Cluster Identification Process

The methodology employed in this study combines Feser (2005) and Hill and Brennan (2000). In particular, the study comprises two stages: the first identifies industry clusters using IMPLAN input-output data; the second extends the first-stage study by indentifying the driver industry within each homogeneous cluster.

If two industries, *i* and *j*, are in the same cluster, they exhibit either one or some of the following patterns:

industry *i* and *j* have very similar input purchasing patterns;

industry *i* and *j* have very similar output selling patterns;

industry *i*'s (*j*'s) input purchasing pattern is very similar to industry *j*'s (*i*'s) output selling pattern.

The industries in a given cluster have a more significant input-output linkage with each other than with the industries outside the cluster. The initial attempt for the industry cluster study was made by Czamanski in the early 1970s. Czamanski (1974) started with a square inter-industry transaction matrix. Two ratios are calculated from the matrix:

$$x_{ij} = \frac{a_{ij}}{P_j}, \; y_{ij} = \frac{a_{ij}}{S_i}$$

where a_{ij} is the dollar value of purchases by industry *j* from industry *i*. x_{ij} denotes the ratio of purchases by industry *j* from industry *i* to the total purchases by industry *j*; y_{ij} denotes the ratio of sales by industry *i* to industry *j* to the total sales by industry *i*. Each vector in X indicates the purchasing pattern of industry *j*. Each vector in Y' indicates the selling pattern of industry *i*. Czamanski (1974) then defined four correlation coefficients to capture each pair of industries with significant similar purchasing or selling patterns:

$r(x_l, x_m)$: industry l and industry m are correlated by having similar purchasing patterns.
$r(y_l, y_m)$: industry l and industry m are correlated by having similar selling patterns.
$r(x_l, y_m)$: industry l has a purchasing pattern which is similar as industry m's selling pattern.
$r(y_l, x_m)$: industry l has a selling pattern which is similar as industry l's purchasing pattern.

The largest of those correlations for each pair of industries are selected by applying data reduction methods to yield industry clusters.

Feser (2005) modified Czamanski's correlation approach from two perspectives. First, rather than using the share of dollar value for correlation analysis, Feser (2005) calculates the correlation by introducing the overlapping of predefined industry groups. The total volume of dollar purchases (sales) of any given industry *i* from (to) industry *j* does not matter in Feser's methodology. By doing so, Feser (2005) eliminated the effect of outliers that make major purchases from a limited set of industries, such as the wholesale trade sector. Second, Feser (2005) avoided the dilemma of applying data reduction algorithms. With data matrices containing hundreds of variables, data reduction methods will generate either highly uneven clusters or mutually exclusive clusters.

Following Feser (2005), we start our first step by constructing an input-output transaction matrix with a set of purchasing industries (buyers) from industry *i*, denoted as B_i, and a set of supplier industries (sellers) to industry *i*, denoted as S_i. If an industry is acting as a supplier to *both* industry *i* and industry *j*, it is in the group I_{ij}^{SS}. Similarly, if an industry is purchasing from *both* industry *i* and industry *j*, it is in the group I_{ij}^{BB}. For industries that are selling to industry *i* and buying from industry *j*, we define a group I_{ij}^{SB}. Alternatively, we define a group I_{ij}^{BS} which contains industries buying from industry *i* and selling to industry *j*.

Mathematically, we define:

$$I_{ij}^{SS} = S_i \cap S_j,\ U_{ij}^{SS} = S_i \cup S_j$$
$$I_{ij}^{BB} = B_i \cap B_j,\ U_{ij}^{BB} = B_i \cup B_j$$
$$I_{ij}^{SB} = S_i \cap B_j,\ U_{ij}^{SB} = S_i \cup B_j$$
$$I_{ij}^{BS} = B_i \cap S_j,\ U_{ij}^{BS} = B_i \cup S_j$$

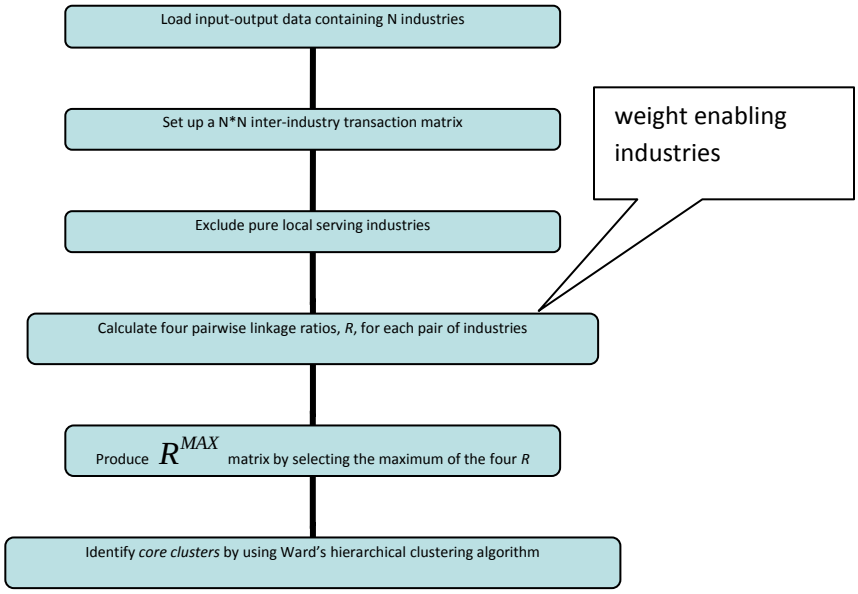
where U_{ij}^{SS} contains a group of suppliers to either industry *i* or industry *j*, or both; U_{ij}^{BB} contains a group of buyers from either industry *i* or industry *j*, or both; U_{ij}^{SB} groups suppliers to industry *i* and buyers from industry *j*; U_{ij}^{BS} groups buyers from industry *i* and suppliers to industry *i*. Of course, there are some industries playing the dual role. In other words, they purchase intermediate input from industry *i* (*j) and* supply output to industry *j* (*i*).

Following Czamanski's four-dimension linkage pattern, we construct four coefficients to represent the functional relationship between each pair of industries in S_i and B_i.

$$R_{ij}^{SS} = \frac{I_{ij}^{SS}}{U_{ij}^{SS}},\ R_{ij}^{BB} = \frac{I_{ij}^{BB}}{U_{ij}^{BB}}$$

$$R_{ij}^{SB} = \frac{I_{ij}^{SB}}{U_{ij}^{SB}},\ R_{ij}^{BS} = \frac{I_{ij}^{BS}}{U_{ij}^{BS}}$$

where R_{ij}^{SS} represents the ratio of the number of common suppliers to industries *i* and *j* over the total number of suppliers to industries *i* and *j*. R_{ij}^{BB} represents the ratio of the number of common buyers from industries *i* and *j* over the total number of buyers from industries *i* and *j*. The higher the ratio, the stronger the industries *i* and *j* are correlated. At the extreme, when industry *i* and *j* have exactly the same sourcing (selling) pattern, the ratio R_{ij}^{SS} (R_{ij}^{BB}) equals 1, otherwise, 0. Similarly, R_{ij}^{SB} and R_{ij}^{BS} are measures of second-tier of linkages between industry *i* and *j*. If industry *i*'s (*j*'s) suppliers are also industry *j*'s (*i*'s) purchasers, industry *i* and *j* are indirectly linked. The higher the number, the stronger the linkages exist between the two industries.



IV.7.b. Number of Clusters

Before extracting clusters from the linkage matrix using Feser (2005) methodology, we need to have a preliminary idea how many clusters need to be extracted. There is no single method of doing this. We use principal component analysis and the cubic clustering criterion method to make a preliminary decision: (1) principal component analysis identified 16 communalities in linkage matrix; and (2) the cubic clustering criterion method (CCC) peaked at 17 clusters. Chart IV.5 below shows the number of clusters using the CCC method.

Chart IV.5: Cluster Selection Criterion

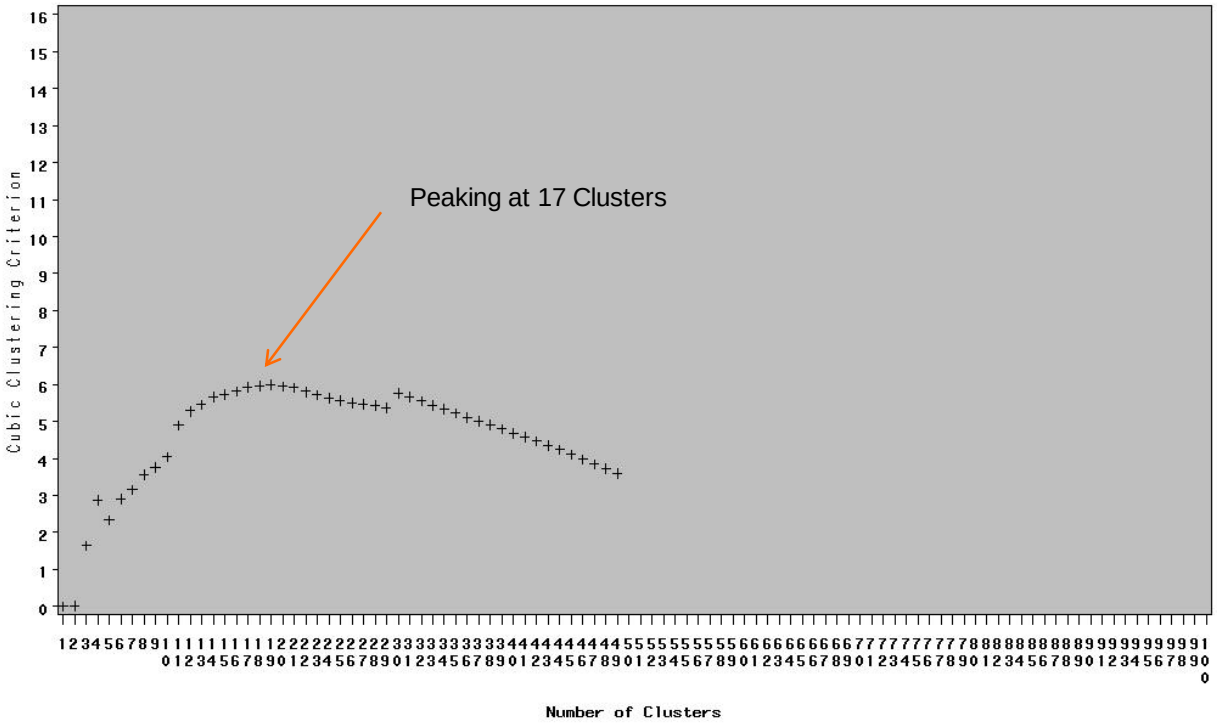
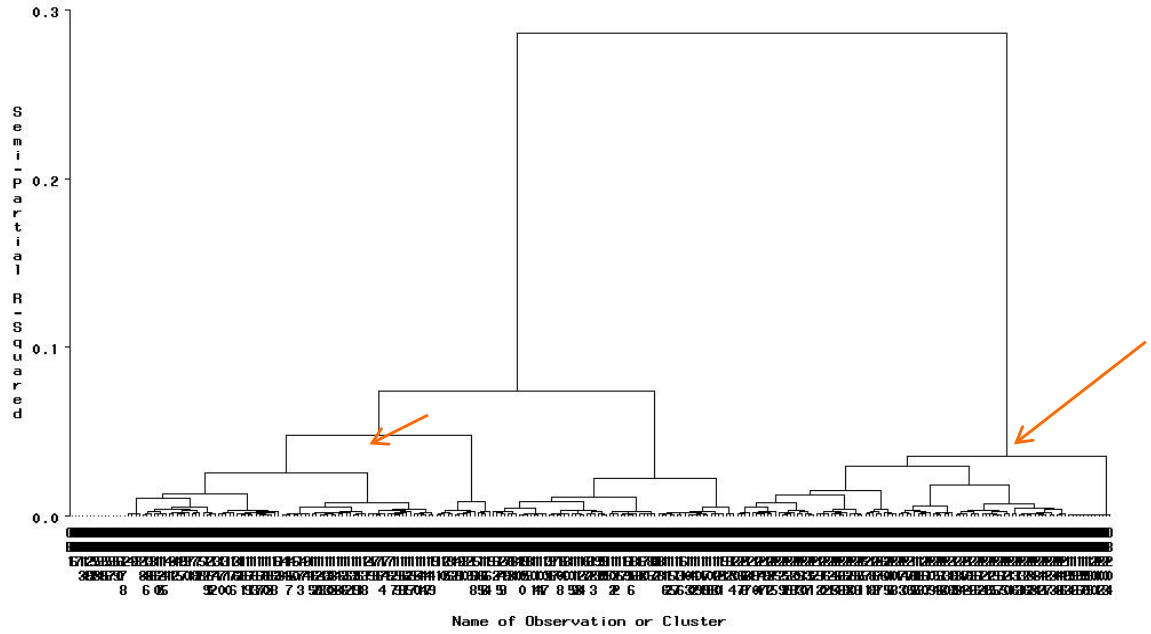


Chart IV.6 below presents a cluster tree based on Ward's Hierarchical Agglomeration method. Although we identified 17 clusters based on backward and forward linkages, resultant clusters were extremely fuzzy and each cluster included a wide range of industries. Since our goal in this study is not just to identify the clusters but also to develop a framework that may be used as part of regional economic development strategies, we need to carefully go over each cluster and regroup industries as sub-clusters, which may be linked with each other not only through linkages (what they buy and sell) but also through their functions (what they produce).

Chart IV.6: Cluster Tree

Linkage-Based Cluster Analysis (Backward and Forward Linkages)
Cluster Tree Based on Ward's Hierarchical Agglomeration Method



IV.7.c. National Cluster Template and Regional Industrial Clusters

Identifying regional industry clusters using statistical techniques is a first step, but it is meaningless from a regional economic development perspective unless these clusters provide a roadmap for local economic development officials. One way to move beyond fuzzy clustering of industries is to align regional clusters with national cluster templates. Since these templates are readily available (Feser, 2005) at http://www.urban.uiuc.edu/faculty/feser/publications.html, we did not run a national-level analysis. We used the national cluster template and generated sub-clusters within each of 17 linkage-based clusters. This process produced 32 sub-clusters. In addition, we also used Feser's (2005) classification of industries by "technology" and "enabling" to further guide us during the target clusters selection process. Table IV.35 below presents industrial clusters in the MTM region and their characteristics in terms of technology and enabling.

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
1	11	Computer and Electronic Equipment	33422	Broadcast and wireless communications equipment	yes	
			334412	All other electronic component manufacturing		
			334513	Industrial process variable instruments	yes	
			334517	Irradiation apparatus manufacturing	yes	
			334518	Watch, clock, and other measuring and controlling device manufacturing	yes	
			335999	Miscellaneous electrical equipment manufacturing	yes	
	12	Construction Machinery and Distribution Equipment	33312	Construction machinery manufacturing	yes	
			333111	Farm machinery and equipment manufacturing		
			333112	Lawn and garden equipment manufacturing		
			333131	Mining machinery and equipment manufacturing	yes	
			333512	Metal cutting machine tool manufacturing		
			333611	Turbine and turbine generator set units manufacturing	yes	
			333921	Elevator and moving stairway manufacturing	yes	
			333924	Industrial truck, trailer, and stacker manufacturing	yes	
	13	Motor Vehicles	3363	Motor vehicle parts manufacturing	yes	
			33611	Automobile and light truck manufacturing	yes	
			336211	Motor vehicle body manufacturing		
			336214	Travel trailer and camper manufacturing		
			336413	Other aircraft parts and equipment	yes	
			336612	Boat building		
2	21	Glass Products	327111	Vitreous china plumbing fixture manufacturing		
			327211	Glass and glass products, except glass containers		
			332812	Metal coating and nonprecious engraving		
			332813	Electroplating, anodizing, and coloring metal		
	22	Machine Tools	3325	Hardware manufacturing		
			3326	Spring and wire product manufacturing		
			33271	Machine shops		
			33272	Tumed product and screw, nut, and bolt manufacturing		
			33291	Metal valve manufacturing	yes	
			332111	Iron and steel forging		
			332212	Hand and edge tool manufacturing		
			332991	Ball and roller bearing manufacturing	yes	
			333511	Industrial mold manufacturing		
			333514	Special tool, die, jig, and fixture manufacturing		
			333515	Cutting tool and machine tool accessory manufacturing		
			333612	Speed changers and mechanical power transmission equipment		
			339995	Burial casket manufacturing		

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
3	31	Concrete, Brick Building Products	32732	Ready-mix concrete manufacturing		
			32739	Other concrete product manufacturing		
			32742	Gypsum product manufacturing		
			327330	Concrete block and brick manufacturing		
			327991	Cut stone and stone product manufacturing		
			335211	Electric housewares and household fan manufacturing		
	32	Nondurable Industry Machinery	8113	Commercial machinery repair and maintenance		
			33321	Sawmill and woodworking machinery		
			33322	Plastics and rubber industry machinery		
			333293	Printing machinery and equipment manufacturing		
			333298	All other industrial machinery manufacturing		
			333319	Other commercial and service industry machinery manufacturing		
			333414	Heating equipment, except warm air furnaces		
			333415	AC, refrigeration, and forced air heating		
			333513	Metal forming machine tool manufacturing		
			333912	Air and gas compressor manufacturing	yes	
			333991	Power-driven handtool manufacturing	yes	
			335312	Motor and generator manufacturing	yes	
			335314	Relay and industrial control manufacturing	yes	
4	41	Metalworking and Fabricated Metal Products	33242	Metal tank, heavy gauge, manufacturing		
			331222	Steel wire drawing		
			332115	All other forging and stamping		
			332312	Fabricated structual metal manufacturing		
			332313	Plate work manufacturing		
			332321	Metal window and door manufacturing		
			332322	Sheet metal work manufacturing		
			332323	Omamental and architectural metal work manufacturing		
			332996	Fabricated pipe and pipe fitting manufacturing	yes	
			332999	Miscellaneous fabricated metal product manufacturing	yes	

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
5	51	Chemical-Based Products	32513	Synthetic dye and pigment manufacturing	yes	
			32518	Other basic inorgamic chemical manufacturing	yes	
			32519	Other basic orgamic chemical manufacturing	yes	
			32592	Explosives manufacturing	yes	
			335991	Carbon and graphite product manufacturing	yes	
	52	Mining	482	Rail transportation		yes
			21231	Stone mining and quarrying		
			21232	Sand, gravel, clay, and refractory mining		
			21239	Other nonmetallic mineral mining		
	53	Paper	32221	Paperboard container manufacturing		
			32611	Plastics packaging materials, film and sheet		
			32613	Laminated plastics plate, sheet and shapes		
			322221	Coated and laminated paper and packaging materials		
			322223	Coated and uncoated paper bag manufacturing		
			322232	Envelop manufacturing		
			323116	Manifold business forms printing		
	54	Petroleum and Gas	211	Oil and gas extraction		
			562	Waste management and remediation services		yes
			2211	Power generation and supply		
			2212	Natural gas distribution		
			2213	Water, sewage and other systems		
			213111	Drilling oil and gas wells		
			324121	Asphalt paving mixture and block manufacturing		
			325211	Plastic material and resin manufacturing	yes	
	55	Plastics Products	32532	Pesticide and other agricultural chemical manufacturing	yes	
			32552	Adhesive manufacturing	yes	
			32612	Plastics pipe, fittings, and profile shapes		
			32614	Foam product manufacturing		
			325991	Custom compounding of purchased resins	yes	
			326191	Plastics plumbing fixtures and all other plastics products		
			326192	Resilient floor covering manufacturing		
	56	Rubber Products	32621	Tire manufacturing		
			32622	Rubber and plastics hose and belting manufacturing		
			32629	Other rubber product manufacturing		
			33992	Sproting and athletic goods manufacturing		
			332214	Kitchen utensil, pot, and pan manufacturing		
			339991	Gasket, packing, and sealing device manufacturing		
			339993	Buttons, pins, and all other miscellaneous manufacturing		

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
6	61	Business Services	42	Wholesale trade		yes
			5324	Machinery and equipment rental and leasing		yes
			5411	Legal services		yes
			5412	Accounting and bookkeeping services		yes
			5413	Architectural and engineering services	yes	yes
			5414	Specialized design services	yes	yes
			5418	Advertising and related services		yes
			5611	Office administrative services		
			5612	Facilities support services		
			5613	Employment services		yes
			5614	Business support services		
			5619	Other support services		yes
			54161	Management consulting services	yes	yes
			54162	Environmental and other technical consulting services	yes	yes
7	71	Leather Products	3159	Accessories and other apparel manufacturing		
			3161	Leather and hide tanning and finishing		
			3162	Footwear manufacturing		
			3169	Other leather product manufacturing		
			314991	Other miscellaneous textile product mills		
	72	Optical Equipment and Instruments	33994	Office supplies, except paper, manufacturing		
			339112	Surgical and medical instrument manufacturing	yes	
			339113	Surgical appliance and supplies manufacturing	yes	
			339992	Musical instrument manufacturing		
	73	Textiles and Apparel	3152	Cut and sew apparel manufacturing		
			31323	Nonwoven fabric mills		
			31331	Textile and fabric finishing mills		
			31332	Fabric coating mills		
			31411	Carpet and rug mills		
			31412	Curtain and linen mills		
			31519	Other apparel knitting mills		
			33791	Mattress manufacturing		
	74	Wood Product and Furniture	337127	Institutional furniture manufacturing		
			337212	Custom architectural woodwork and millwork		
			337214	Office furniture, except wood, manufacturing		
			337215	Showcases, partitions, shelving, and lockers		

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enablir
8	81	Aluminum and Copper Products	33151	Ferrous metal foundries		
			33243	Metal can, box, and other container manufacturing		
			331111	Iron and steel mills		
			331314	Secondary smelting and alloying of aluminum		
			331319	Other aluminum rolling and drawing		
			331419	Primary nonferrous metal, except copper and aluminum		
			331421	Copper rolling, drawing, and extruding		
			331491	Nonferrous metal, except copper and aluminum, shaping		
			331521	Aluminum foundries		
			339116	Dental laboratories		
9	91	Feed Products	115	Agriculture and forestry support activities		
			1122	Animal production, except cattle and poultry and eggs		
			1123	Poultry and egg production		
			1142	Hunting and trapping		
			11211	Cattle ranching and farming		
			311119	Other animal food manufacturing		
	92	Packaged Food Products	31133	Confectionery manufacturing from purchased chocolate		
			31199	All other food manufacturing		
			311611	Animal, except poultry, slaughtering		
			311612	Meat processed from carcasses		
			311615	Poultry processing		
			311811	Bread and bakery product, except frozen, manufacturing		
			311919	Other snack food manufacturing		
			311941	Mayonnaise, dressing, and sause manufacturing		
10	101	Hotels and Transportation Services	481	Air transportation		yes
			483	Water transportation		yes
			484	Truck transportation		yes
			485	Transit and ground passenger transportation		yes
			493	Warehousing and storage		yes
			531	Real estate		yes
			5615	Travel arrangement and reservation services		yes
			5617	Services to buildings and dwellings		yes
			7131	Other amusement, gambling, and recreation industries		
			71394	Fitness and recreational sports centers		
			71395	Bowling centers		
			72111	Hotels and motels, including casino hotels		
			72119	Other accommodations		

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
11	111	Management, Higher Education and Hospitals	487	Scenic and sightseeing trans and support activities for transaction		yes
			5417	Scientific research and development services	yes	yes
			6112	Colleges, universities, and junior colleges		
			6114	Other educational services		
			6214	Other ambulatory health care services	yes	
			8134	Civic, social, professional and similar organizations		
			32540	Pharmaceutical and medicine manufacturing	yes	
			54191	All other miscellaneous professional and technical services		
			54194	Veterinary services		yes
	112	Construction	23	Maintenance and repair of farm and nonfarm residential structures		
			23	Maintenance and repair of nonresidential buildings		
			23	Other maintenance and repair construction		
			32551	Paint and coating manufacturing	yes	
			33593	Wiring device manufacturing	yes	
			321991	Manufactured home, mobile home, manufacturing		
12	121	Arts and Media	5121	Motion picture and video industries		yes
			5122	Sound recording industries		yes
			5131	Radio and television broadcasting		yes
			7111	Performing arts companies		
			7112	Spectator sports		
			7113	Promoters of performing arts and sprorts and agents for public figures		
			7115	Independent artists, writers,and performers		
13	131	Financial Services and Insurance	492	Couriers and messengers		yes
			521	Monetary authorities and depository credit intermediation		yes
			523	Securities, commodity contracts, investments		yes
			525	Funds, trusts, and other financial vehicles		yes
			5222	Nondepository credit intermediation and related services		yes
			5241	Insurance carriers		yes
			5242	Insurance agencies, brokerages, and related		yes
	132	Information Services	5133	Telecommunications	yes	yes
			5141	Infomation services	yes	yes
			5142	Data processing services	yes	yes
			5616	Investigation and security services		yes
			8112	Electronic equipment repair and maintenance		
			54192	Photographic services		yes
			541511	Custom computer programming services	yes	yes
			541512	Computer systems design services	yes	yes
			541513	Other computer related services, including facilities management	yes	yes

Table IV.35: Primary and Sub-Clusters, Sectors and Their Characteristics (Continued)

Primary Clusters	Sub-Clusters	Definition	NAICS	Sector Names	Technology-Based	Enabling
14	141	Wood Building Products and processing	1133	Logging		
			32192	Wood container and pallet manufacturing		
			33711	Wood kitchen cabinet and countertop manufacturing		
			321113	Sawmills		
			321114	Wood preservation		
			321213	Engineered wood member and truss manufacturing		
			321911	Wood windows and door manufacturing		
			321912	Cut stock, resawing lumber, and planing		
			321918	Other millwork, including flooring		
			321992	Refabricated wood building manufacturing		
			321999	Miscellaneous wood product manufacturing		
			337121	Upholstered household furniture manufacturing		
			337122	Nonupholstered wood household furniture manufacturing		
			337125	Other household and institutional furniture		
15	151	Breweries and Distilleries	31142	Fruit and vegetable canning and drying		
			31211	Soft drink and ice manufacturing		
			31213	Wineries		
			31214	Distilleries		
			32562	Toilet preparation manufacturing	yes	
16	161	Printing and Publishing	33995	Sign manufacturing		
			51111	Newspaper publishers		yes
			51112	Periodical publishers		yes
			51113	Book publishers		yes
			51114	Database, directory, and other publishers		yes
			323111	Commercial printing		
17	171	Farming	1112	Vegetable and melon farming		
			1114	Greenhouse and nursery production		
			11111	Oilseed farming		
			11113	Grain farming		
			11131	Fruit farming		
			11191	Tobacco farming		
			11192	Cotton farming		
			11194	All other crop farming		

V. CLUSTER INDICATORS IN THE MTM REGION

V.1. Overview

In the previous chapter, we identified 32 sub-clusters in the MTM region. What is next? How does identifying industry clusters help the MTM region? As mentioned in the previous chapter (Chapter IV), identifying industry clusters alone is meaningless from a region's economic development standpoint unless we carefully analyze them and develop economic development strategies based on certain characteristics of these sub-clusters. In this section, we present a set of regional indicators at the cluster level that shows us the contribution of these clusters to the MTM region's economy. The indicators selected in this section are comprehensive enough to see how central a cluster is in the MTM region's economy as well as the relative strength of each cluster compared to the corresponding national cluster.

The selection of major indicators used in this section is informed by Hill and Brennan (2000), whose methodology combines cluster analysis with discriminant analysis. This two-step approach includes (1) identifying the industry clusters and (2) using discriminant analysis, a statistical procedure, to distinguish these homogeneous industry clusters and then identify driver industries.

A notable concept in Hill and Brennan (2000) is *driver industries*, which does not mean the largest, fastest-growing, or most technology-intensive industries. Driver industries are defined as *the industries in which a region has its greatest competitive advantage,* measured by the productivity of each worker in an industry. In that sense, driver industries are those with the highest levels of productivity in the region. Since worker productivity is unobservable, we can use value added per hour worked as a proxy to productivity. Hill and Brennan (2000) construct a proxy variable for productivity by estimating industry-specific gross metropolitan product (GMP) per hour worked.

The four categories of indicators for indentifying driver industries are summarized as follows:

- **Competitiveness (4 indicators)**
  - The most telling indicator of competitiveness advantage is the productivity of each worker in an industry. The authors construct a proxy variable for productivity by estimating industry-specific gross metropolitan product (GMP) per hour worked.
  - The second measure of competitiveness is the change in the share of an industry's value added, shipments, or product value that originates in the

regional economy. Hill and Brennan (2000) use the regional industry's change in national employment share as a proxy.[1]

- The third measure of competitiveness, more accurately, of *future* competitiveness, is relative earnings. Specifically, we want to know whether the industry's per-employee payroll, a proxy for average earnings, is greater than the national average.
- The fourth indicator is the changes in relative earnings. If relative earnings are high and have increased over time, then it is a sign of continued competitive advantage; if relative earnings are high but decreasing, then it is a sign of eroding advantage; if relative earnings are low but increasing, then it is a sign of possible emerging competitiveness advantage; finally, if relative earnings are low and decreasing over time, then it is a sign of no advantage.

- **Exports (2 indicators)**
  - The first indicator is the percentage of an industry's total output that is exported.
  - The second indicator is the share of local exports accounted for by the industry.

- **Centrality (3 indicators)**
  A driver industry should have a close set of customer relationships with other industries in the region.

  - The first measure of centrality is the industry's purchasing relationships (or forward linkages).
  - The second measure of centrality is the industry's selling relationships (or backward linkages)
  - Another indicator, the change in the industry's share of regional employment, measures the change in centrality. It is also a measure of the industry's competitive position in the region.

- **Employment specialization (2 indicators)**
  The two measures of employment specialization (or concentration) can also be viewed as indicators of each industry's competitive position.

  - The first measure is location quotient (*LQ*). High *LQ* is an indicator of cluster economies, especially if the *LQ* is accompanied by a growing share of national employment in that industry over time.
  - The second measure of employment specialization is the changes in *LQ*.

[1] The period should be sufficiently long to allow employers to adjust their employment level.

Summarily, driver industries have some combination of the following characteristics:

- large export share of their products
- large export share of the region's total exports
- large purchasing and/or selling multipliers
- high productivity
- large *LQs*
- an increasing share of national employment

In this study, as analyzed in Chapter IV, we used Feser (2005) methodology to extract industry clusters in the MTM region. In this part of the analysis, the second part of the Hill and Brennan (2000) method will be utilized to extract weights for selected indicators that will be used in performance-based rankings of industrial clusters in the MTM region. In this sense, the Hill and Brennan (2000) method will guide us as to which indicators to use to make sense of industry clusters in the MTM region. Furthermore, we performed principal component analysis using 13 indicators of Hill and Brannan to identify which indicators to weight.

V.2. Ranking Methodology

Taking 13 indicators of Hill and Brennan as a baseline and adding additional indicators, we compiled a list of 30 indicators to be used in the ranking of industry clusters in the MTM region. Table V.1 below explains how we derived 13 baseline indicators.

Table V.1: Baseline Indicators from Hill and Brennan (2000)

Indicators of Driver Industries (13 indicators)

Competitiveness (4 indicators)
Productivity--the productivity of each worker (output/employment) in an industry.
deltaN--the change in the share of an industry's employment.
RV06—relative value-added, ratio of local average value-added (regional value-added/employment) to national average value-added (national value-added/national employment).
deltaRV--the changes in relative value-added.

Exports (2 indicators)
PCTYX--the percentage of an industry's total output that is exported.
PCTX--the share of local exports accounted for by the industry.

Centrality (3 indicators)
sell-- forward linkages (industry's total selling/region's total selling).
buy--backward linkages (industry's total buying/region's total buying).
deltaL—the changes in industry's share of regional employment.

Table V.1: Baseline Indicators from Hill and Brennan (2000) (Continued)

Indicators of Driver Industries (13 indicators)

Employment specialization (2 indicators)
LQ06--location quotient (*LQ*) (industry's share of regional employment/industry's share of national employment).
deltaLQ--the changes in *LQ* (*LQ06-LQ02).*

Shift-share (2 indicators)
IM—industry mix (industry's national growth rate-national total employment growth rate).
RS—regional shift effect (industry's regional growth rate- industry's national growth rate).

Table V.2 below provides component scores for each of the 13 indicators extracted using principal component analysis. These scores along with the coefficients from discriminant analysis are used as weights for certain indicators in the final ranking of the MTM region clusters.

Table V.2: Indicator Weights

Component Score Coefficient Matrix

	Component			
	1	2	3	4
PCTYX	-0.0237	-0.0938	0.0062	**0.4573**
PCTX	-0.0314	**0.4087**	-0.0007	0.0299
productivity	-0.0316	0.1008	0.1905	**0.2329**
RV06	0.0153	-0.0154	**0.4711**	-0.0910
LQ06	0.1064	0.0913	-0.0509	**0.2931**
deltaN	**0.4039**	0.0219	0.0007	0.0330
deltaRV	0.0278	-0.0358	**0.4703**	-0.0724
deltaL	**0.2276**	-0.0234	0.0108	-0.1878
deltaLQ	**0.3990**	0.0098	0.0076	-0.0058
IM	-0.0081	0.0677	0.0869	**-0.4774**
RS	0.1871	-0.0374	0.0180	0.2058
buy	-0.0104	**0.4061**	-0.0063	-0.0217
sell	0.0091	**0.2912**	-0.0089	**-0.2540**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

Table V.3 presents all indicators with assigned weights utilizing principal component and discriminant analysis.

Table V.3: Guide to Cluster Indicators Used in Final Rankings

Indicator	Weight	Explanation
Employment (2006)	Original	
Percent change from 2002	Original	
Location Quotient 2006	Original	
Location Quotient Change (2006-02)	1.40	Based on Discriminant and Factor Analysis
Change in Employment Share (2006-02)	1.35	Based on Discriminant and Factor Analysis
Change in Industry's Share in the National Industry	1.40	Based on Discriminant and Factor Analysis
Total Compensation 2006	Original	
Percent Change from 2002	Original	
Change in Average Compensation (2006-02)	Original	
Region's Average Compensation as Percent of Average U.S. Compensation	Original	
Average Compensation 2006	Original	
Total Value-Added 2006	Original	
Percent Change from 2002	Original	
Average Value-Added 2006	Original	
Change in Average Value-Added (2006-02)	Original	
Region's Average Value Added as % of U.S. Value-Added	1.54	Based on Discriminant and Factor Analysis
Change in Relative Value Added (2006-02)	1.45	Based on Discriminant and Factor Analysis
Output 2006	Original	
Percent Change from 2002	Original	
Productivity 2006	1.55	Based on Discriminant and Factor Analysis
Change in Productivity (2006-02)	Original	
Region's Productivity as Percent of U.S. Productivity	Original	
Exports (2006)	Original	
Percent of Exports in Output	1.48	Based on Discriminant and Factor Analysis
Percent of Industry Exports in Region's Export	Original	
Industry Mix Effect (National Industry Growth-National Growth)	1.15	Based on Discriminant and Factor Analysis
Regional Shift Effect (Regional Industry Growth-National Industry Growth)	Original	
Local Linkages (Regional Buy-Linkage)	1.47	Based on Discriminant and Factor Analysis
Local Linkages (Regional Sell-Linkage)	1.35	Based on Discriminant and Factor Analysis
Percent of Employment in Technology Sectors	Original	

In terms of final rankings of the MTM region clusters, we first standardized all indicators between "0" and "1" using cumulative normal distribution function. This procedure allows us to compare different sets of cluster indicators with each other. Cumulative normal distribution has "0" mean and "1" standard deviation. We used the following equation for this purpose:

$$f(x,\mu,\sigma) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\left(\frac{(x-\mu)^2}{2\sigma^2}\right)},$$

where "x" is the value, "μ" is the arithmetic mean of the distribution, and "σ" is standard deviation.

After transforming each of 30 indicators, we then obtained the average score and ranked each of 32 MTM region clusters based on its average score.

V.3. Cluster Indicators Used in Rankings

Before presenting the rankings, we would like to first introduce the indicators of concern by cluster in the MTM region (Tables V.4-10 and Figure V.1). Here is the guide for the tables and figure below:

Table V.4: Employment and Changes in Employment by Cluster

Figure V.1: Cluster Status by Employment Size and Specialization

Table V.5: Employee Compensation and Related Indicators by Cluster

Table V.6: Value Added and Related Indicators by Cluster

Table V.7: Output, Productivity, and Related Indicators by Cluster

Table V.8: Exports and Related Indicators by Cluster

Table V.9: Regional Competitiveness and Linkages by Cluster

Table V.10: Technology Content by Cluster

Table V.4: Employment and Changes in Employment by Cluster

Cluster Indicators: Employment		Employment		Location Quotient (LQ)		Change in LQ	Employment Share	Industry Share Change	Ranked by	LQ2006-02
Cluster	Cluster name	2006	Percent Change from 2002	LQ2002	LQ2006	LQ2006-2002	Change (06-02) (% Point)	(R/US) (% Point)	LQ2006	% Change
11	Computer and Electronic Equipment	800	9.47	1.34	1.48	0.15	0.99	0.02	18	11
12	Construction Machinery and Distribution Equipment	316	-81.57	6.92	1.02	-5.91	0.17	-0.71	24	-85
13	Motor Vehicles	10,506	-9.36	8.12	7.69	-0.43	0.82	-0.03	3	-5
21	Glass Products	1,457	35.56	3.49	5.10	1.61	1.22	0.21	5	46
22	Machine Tools	2,115	-24.08	2.89	2.05	-0.83	0.68	-0.09	16	-29
31	Concrete, Brick Building Products	411	25.55	1.09	1.18	0.09	1.13	0.01	22	9
32	Nondurable Industry Machinery	4,331	-35.88	6.60	4.94	-1.66	0.58	-0.19	6	-25
41	Metalworking and Fabricated Metal Products	991	-1.33	1.48	1.36	-0.12	0.89	-0.01	21	-8
51	Chemical-Based Products	271	41.29	1.28	1.91	0.63	1.27	0.08	17	49
52	Mining	378	74.69	0.66	0.96	0.30	1.57	0.04	25	46
53	Paper	1,520	-19.88	3.90	3.02	-0.88	0.72	-0.10	9	-23
54	Petroleum and Gas	1,601	46.00	0.70	0.87	0.17	1.32	0.02	26	24
55	Plastics Products	1,594	-32.64	3.42	2.30	-1.12	0.61	-0.13	14	-33
56	Rubber Products	3,433	20.83	6.44	8.23	1.79	1.09	0.24	1	28
61	Business Services	15,122	-18.39	0.82	0.58	-0.25	0.74	-0.03	30	-30
71	Leather Products	424	-43.17	4.86	3.33	-1.53	0.51	-0.18	8	-32
72	Optical Equipment and Instruments	2,511	3.27	7.70	7.98	0.28	0.93	0.06	2	4
73	Textiles and Apparel	1,239	-38.76	2.96	2.32	-0.64	0.55	-0.07	13	-22
74	Wood Product and Furniture	126	-55.93	1.53	0.71	-0.82	0.40	-0.10	27	-54
81	Aluminum and Copper Products	1,138	-16.96	3.12	2.41	-0.72	0.75	-0.08	12	-23
91	Feed Products	10,517	24.81	3.37	4.04	0.68	1.12	0.09	7	20
92	Packaged Food Products	2,811	-1.98	2.65	2.68	0.04	0.88	0.01	10	1
101	Hotels and Transportation Services	12,209	42.85	0.52	0.61	0.09	1.29	0.01	28	17
111	Management, Higher Education and Hospitals	14,904	283.86	0.55	1.43	0.89	3.46	0.11	20	163
112	Construction	1,939	22.67	0.84	1.08	0.24	1.10	0.03	23	29
121	Arts and Media	488	-45.77	0.34	0.17	-0.18	0.49	-0.02	32	-52
131	Financial Services and Insurance	6,489	39.49	0.46	0.58	0.12	1.26	0.02	29	26
132	Information Services	2,533	2.25	0.37	0.41	0.05	0.92	0.01	31	13
141	Wood Building Products and processing	2,640	5.21	2.42	2.14	-0.28	0.95	-0.03	15	-12
151	Breweries and Distilleries	891	-17.80	3.37	2.43	-0.94	0.74	-0.11	11	-28
161	Printing and Publishing	2,522	27.29	1.15	1.44	0.29	1.15	0.04	19	25
171	Farming	9,164	-14.87	5.33	5.19	-0.14	0.77	0.00	4	-3

Figure V.1: Cluster Status by Employment Size and Specialization

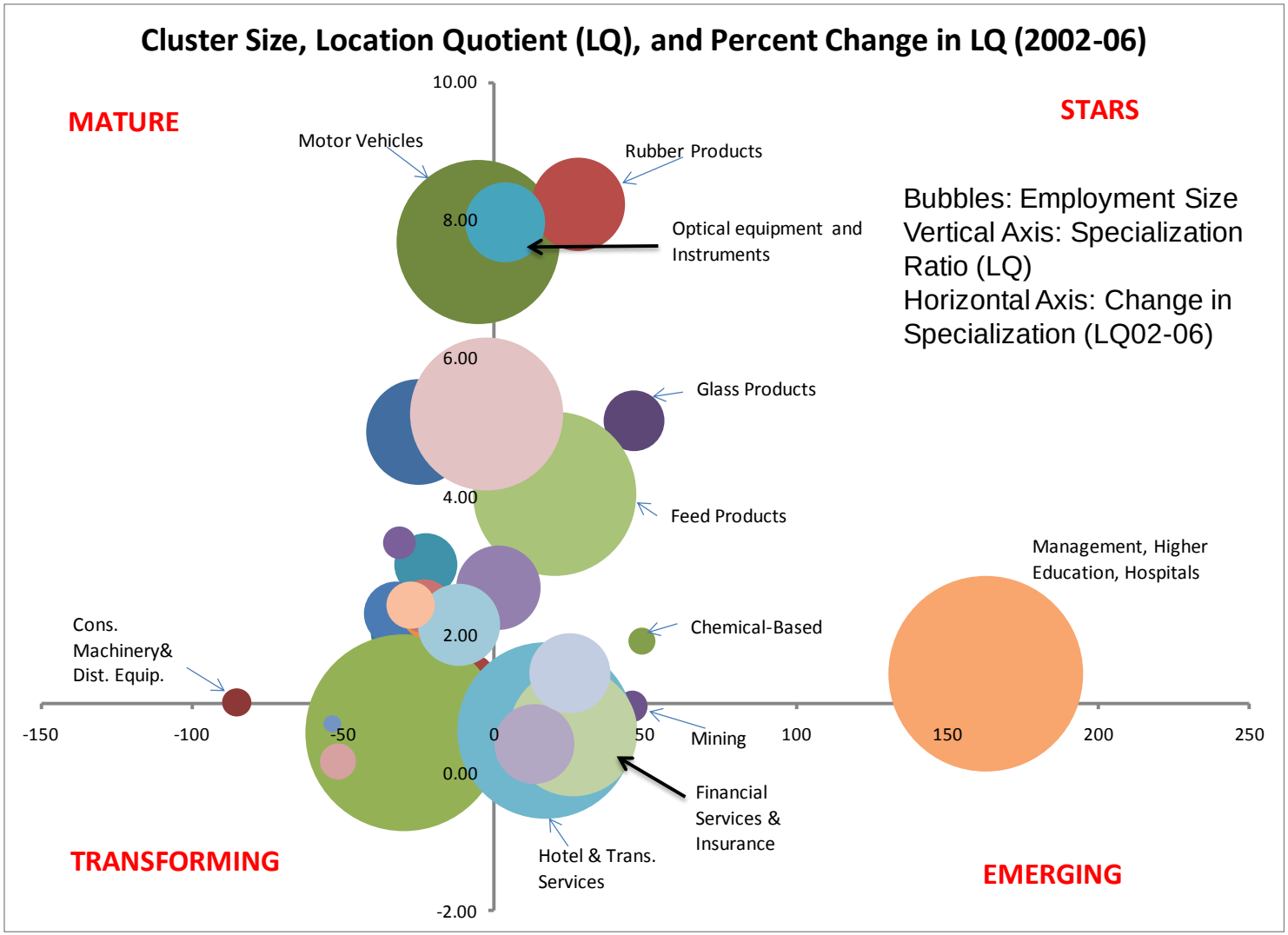


Table V.5: Employee Compensation and Related Indicators by Cluster

Cluster Indicators: Employee Compensation (mil. $) and Average Comp. ($)		Total Compensation (million $)		Average Comp (C) ($)		Change in C	Region's C	Ranked by
Cluster	Cluster name	2006	Percent Change from 2002	C2002	C2006	C2006-02 (%)	as % of US C06	C2006
11	Computer and Electronic Equipment	36	11.87	$44,483	$45,456	2.19	60.07	14
12	Construction Machinery and Distribution Equipment	17	-79.01	$47,829	$54,455	13.85	78.02	6
13	Motor Vehicles	940	2.75	$78,882	$89,430	13.37	110.73	1
21	Glass Products	57	61.62	$32,677	$38,958	19.22	79.69	20
22	Machine Tools	102	-10.16	$40,596	$48,035	18.33	84.37	10
31	Concrete, Brick Building Products	17	32.62	$39,780	$42,019	5.63	77.49	17
32	Nondurable Industry Machinery	207	-33.70	$46,118	$47,688	3.40	91.97	11
41	Metalworking and Fabricated Metal Products	38	-15.66	$44,782	$38,281	-14.52	73.05	21
51	Chemical-Based Products	24	77.95	$69,644	$87,714	25.95	91.02	2
52	Mining	20	130.44	$40,993	$54,076	31.91	67.23	7
53	Paper	87	6.65	$43,044	$57,299	33.12	92.84	5
54	Petroleum and Gas	77	44.02	$48,788	$48,126	-1.36	63.60	9
55	Plastics Products	72	-26.75	$41,740	$45,390	8.75	88.40	15
56	Rubber Products	179	58.02	$39,826	$52,085	30.78	99.50	8
61	Business Services	484	-6.31	$27,887	$32,015	14.80	67.05	25
71	Leather Products	20	3.49	$26,078	$47,491	82.11	102.28	12
72	Optical Equipment and Instruments	107	36.20	$32,434	$42,775	31.88	61.47	16
73	Textiles and Apparel	37	-32.52	$26,831	$29,565	10.19	74.22	26
74	Wood Product and Furniture	5	-43.25	$30,656	$39,475	28.77	71.80	19
81	Aluminum and Copper Products	66	-11.75	$54,256	$57,658	6.27	85.36	4
91	Feed Products	30	75.80	$2,006	$2,825	40.85	24.38	32
92	Packaged Food Products	113	19.24	$33,152	$40,331	21.65	102.23	18
101	Hotels and Transportation Services	225	13.13	$23,249	$18,411	-20.81	77.54	30
111	Management, Higher Education and Hospitals	545	409.35	$27,538	$36,541	32.69	88.46	22
112	Construction	41	6.89	$24,075	$20,978	-12.86	51.40	29
121	Arts and Media	13	-34.06	$22,602	$27,483	21.60	85.74	27
131	Financial Services and Insurance	215	37.45	$33,585	$33,092	-1.47	48.95	24
132	Information Services	117	11.55	$42,476	$46,336	9.09	80.05	13
141	Wood Building Products and processing	68	9.11	$24,886	$25,809	3.71	68.47	28
151	Breweries and Distilleries	61	-5.29	$59,656	$68,741	15.23	111.32	3
161	Printing and Publishing	87	46.18	$29,880	$34,315	14.84	64.98	23
171	Farming	33	40.26	$2,180	$3,592	64.77	32.52	31

Table V.6: Value Added and Related Indicators by Cluster

Cluster Indicators: Value Added (mil. $) and Average Valeu Added ($)		Total Value Added (million $)		Average ValueA (VA) ($)		Change in VA	Region's VA	Change in REL	Ranked by
Cluster	Cluster name	2006	Percent Change from 2002	VA2002	VA2006	VA2006-02 (%)	as % of US VA06	ValueAd (%)	VA2006
11	Computer and Electronic Equipment	40	-12.38	$61,786	$49,455	-19.96	62.62	-27.88	26
12	Construction Machinery and Distribution Equipment	28	-79.49	$80,233	$89,292	11.29	74.37	-24.94	8
13	Motor Vehicles	1,423	-9.07	$135,023	$135,460	0.32	133.11	8.85	4
21	Glass Products	113	67.46	$62,814	$77,593	23.53	87.75	-1.13	17
22	Machine Tools	192	-3.34	$71,454	$90,972	27.32	110.86	9.53	7
31	Concrete, Brick Building Products	35	557.76	$16,333	$85,570	423.90	91.66	69.18	13
32	Nondurable Industry Machinery	295	-28.28	$60,888	$68,107	11.86	85.59	-22.69	19
41	Metalworking and Fabricated Metal Products	62	-9.01	$68,319	$63,004	-7.78	71.92	-23.47	21
51	Chemical-Based Products	47	39.87	$174,682	$172,923	-1.01	96.85	-8.67	2
52	Mining	43	113.39	$92,153	$112,569	22.15	77.57	5.95	5
53	Paper	130	16.79	$58,857	$85,804	45.78	87.20	13.64	11
54	Petroleum and Gas	223	44.98	$140,336	$139,357	-0.70	41.20	-18.32	3
55	Plastics Products	153	-6.30	$68,962	$95,930	39.11	93.96	7.19	6
56	Rubber Products	294	80.51	$57,325	$85,644	49.40	103.81	18.93	12
61	Business Services	856	2.50	$45,085	$56,627	25.60	73.30	9.10	23
71	Leather Products	25	0.74	$32,775	$58,097	77.26	105.59	35.56	22
72	Optical Equipment and Instruments	223	36.48	$67,187	$88,791	32.16	60.31	-3.92	9
73	Textiles and Apparel	65	-34.46	$48,917	$52,351	7.02	74.89	-15.71	24
74	Wood Product and Furniture	11	-20.11	$46,756	$84,759	81.28	79.38	7.78	14
81	Aluminum and Copper Products	92	-0.98	$67,621	$80,632	19.24	67.21	-24.84	16
91	Feed Products	103	7.94	$11,312	$9,783	-13.51	54.13	-19.72	32
92	Packaged Food Products	195	55.95	$43,646	$69,443	59.10	114.70	32.71	18
101	Hotels and Transportation Services	826	59.03	$60,739	$67,618	11.33	89.91	1.17	20
111	Management, Higher Education and Hospitals	708	375.91	$38,293	$47,477	23.98	77.72	3.93	27
112	Construction	81	16.39	$44,113	$41,858	-5.11	70.90	-15.10	29
121	Arts and Media	19	-28.05	$29,743	$39,460	32.67	77.70	4.39	30
131	Financial Services and Insurance	550	42.73	$82,790	$84,713	2.32	71.17	-11.31	15
132	Information Services	222	19.99	$74,790	$87,762	17.35	81.37	-2.19	10
141	Wood Building Products and processing	131	21.60	$42,984	$49,682	15.58	79.09	-2.64	25
151	Breweries and Distilleries	358	14.50	$288,552	$401,954	39.30	259.80	55.50	1
161	Printing and Publishing	115	40.82	$41,352	$45,746	10.63	52.43	-4.32	28
171	Farming	143	23.11	$10,761	$15,562	44.62	31.12	2.49	31

Table V.7: Output, Productivity and Related Indicators by Cluster

Cluster Indicators: Output (in million dollars) and Productivity ($)		Output (million $)		Productivity (PRO) ($)		Change in PRO	Region's PRO	Ranked by
Cluster	Cluster name	2006	Percent Change from 2002	PRO2002	PRO2006	PRO2006-02 (%)	as % of US 06	PRO2006
11	Computer and Electronic Equipment	166	-0.91	$229,431	$207,664	-9.49	69.05	13
12	Construction Machinery and Distribution Equipment	127	-74.71	$293,910	$403,208	37.19	82.10	5
13	Motor Vehicles	9,151	38.20	$571,218	$870,985	52.48	162.58	2
21	Glass Products	291	89.05	$143,344	$199,903	39.46	102.03	15
22	Machine Tools	396	-3.57	$147,317	$187,103	27.01	101.58	18
31	Concrete, Brick Building Products	94	67.18	$171,546	$228,431	33.16	89.94	12
32	Nondurable Industry Machinery	1,231	-6.25	$194,449	$284,306	46.21	129.00	10
41	Metalworking and Fabricated Metal Products	189	23.89	$151,748	$190,537	25.56	87.08	17
51	Chemical-Based Products	119	99.78	$309,130	$437,097	41.40	58.28	4
52	Mining	75	134.70	$147,426	$198,074	34.36	80.98	16
53	Paper	466	12.49	$218,120	$306,267	40.41	98.52	8
54	Petroleum and Gas	932	188.68	$294,406	$582,130	97.73	100.44	3
55	Plastics Products	466	-3.54	$204,169	$292,389	43.21	99.33	9
56	Rubber Products	787	74.87	$158,362	$229,201	44.73	106.53	11
61	Business Services	1,384	9.99	$67,923	$91,546	34.78	74.22	28
71	Leather Products	76	-4.95	$107,633	$180,018	67.25	119.45	21
72	Optical Equipment and Instruments	454	73.95	$107,236	$180,629	68.44	63.66	20
73	Textiles and Apparel	248	-0.84	$123,786	$200,420	61.91	90.39	14
74	Wood Product and Furniture	20	-36.85	$110,523	$158,376	43.30	86.70	23
81	Aluminum and Copper Products	403	10.13	$267,079	$354,190	32.62	78.66	6
91	Feed Products	398	45.97	$32,347	$37,832	16.95	46.33	31
92	Packaged Food Products	917	83.87	$173,853	$326,121	87.58	111.04	7
101	Hotels and Transportation Services	1,438	61.53	$104,195	$117,816	13.07	96.19	27
111	Management, Higher Education and Hospitals	1,356	354.45	$76,849	$90,981	18.39	71.09	29
112	Construction	233	44.65	$101,709	$119,940	17.92	85.53	25
121	Arts and Media	58	-28.33	$89,239	$117,929	32.15	115.25	26
131	Financial Services and Insurance	912	33.26	$147,167	$140,595	-4.47	70.22	24
132	Information Services	426	45.12	$118,420	$168,069	41.93	92.44	22
141	Wood Building Products and processing	490	39.46	$139,899	$185,440	32.55	106.04	19
151	Breweries and Distilleries	809	42.78	$522,723	$908,002	73.71	155.31	1
161	Printing and Publishing	208	-5.00	$110,752	$82,658	-25.37	52.90	30
171	Farming	214	20.15	$16,540	$23,346	41.14	26.76	32

Table V.8: Exports and Related Indicators by Cluster

Cluster Indicators: Exports (mil. $)		Total Exporst (million $)		Total Imports	Export/Output	Export/Region Ex	Export/Import Ratio	Ranked by
Cluster	Cluster name	E2006	Shift in FExport Share	I2006 (million $)	2006 (%)	2006 (%)	E/I2006	E/I2006
11	Computer and Electronic Equipment	109	-48.82	95	65.54	0.70	1.15	21
12	Construction Machinery and Distribution Equipment	59	7.49	81	46.24	0.38	0.73	26
13	Motor Vehicles	6,483	-7.83	725	70.85	41.70	8.95	1
21	Glass Products	199	-5.48	104	68.30	1.28	1.90	11
22	Machine Tools	290	-6.22	151	73.21	1.86	1.92	10
31	Concrete, Brick Building Products	84	-0.41	42	89.39	0.54	2.00	8
32	Nondurable Industry Machinery	1,097	-0.88	751	89.10	7.06	1.46	15
41	Metalworking and Fabricated Metal Products	188	3.59	103	99.48	1.21	1.82	12
51	Chemical-Based Products	83	24.24	52	69.57	0.53	1.59	14
52	Mining	47	3.20	23	62.90	0.30	2.00	7
53	Paper	389	0.07	273	83.44	2.50	1.42	16
54	Petroleum and Gas	587	4.64	519	62.97	3.78	1.13	22
55	Plastics Products	281	-1.24	234	60.25	1.81	1.20	20
56	Rubber Products	765	1.83	391	97.17	4.92	1.96	9
61	Business Services	207	13.08	310	14.94	1.33	0.67	29
71	Leather Products	59	18.65	33	77.04	0.38	1.81	13
72	Optical Equipment and Instruments	396	-9.08	146	87.21	2.54	2.71	3
73	Textiles and Apparel	111	-1.23	130	44.83	0.72	0.85	24
74	Wood Product and Furniture	2	20.05	6	8.09	0.01	0.25	30
81	Aluminum and Copper Products	214	-6.93	230	53.15	1.38	0.93	23
91	Feed Products	114	1.22	159	28.73	0.74	0.72	27
92	Packaged Food Products	708	-2.29	299	77.21	4.55	2.37	5
101	Hotels and Transportation Services	74	16.61	330	5.18	0.48	0.23	31
111	Management, Higher Education and Hospitals	863	-10.78	378	63.67	5.55	2.28	6
112	Construction	91	1.49	73	39.17	0.59	1.24	19
121	Arts and Media	3	-18.62	25	5.86	0.02	0.13	32
131	Financial Services and Insurance	136	-7.84	198	14.91	0.88	0.69	28
132	Information Services	98	2.01	117	22.92	0.63	0.84	25
141	Wood Building Products and processing	284	-1.69	208	57.94	1.82	1.36	18
151	Breweries and Distilleries	821	-3.65	319	100.00	5.28	2.58	4
161	Printing and Publishing	97	-0.19	69	46.58	0.62	1.40	17
171	Farming	151	-0.65	42	70.40	0.97	3.55	2

Table V.9: Regional Competitiveness and Linkages by Cluster

Cluster Indicators: Regional Competitiveness and Linkages		Competitiveness: Growth Due To		Linkages		Ranked by
Cluster	Cluster name	Industry Mix (IM)	Regional Shift (RS)	Buy	Sell	RS
11	Computer and Electronic Equipment	-0.12	0.13	0.60	0.80	13
12	Construction Machinery and Distribution Equipment	0.14	-1.04	0.35	0.17	32
13	Motor Vehicles	-0.15	-0.03	32.08	15.55	18
21	Glass Products	-0.18	0.45	1.40	1.63	4
22	Machine Tools	-0.04	-0.28	1.00	1.65	26
31	Concrete, Brick Building Products	0.04	0.13	0.32	0.01	14
32	Nondurable Industry Machinery	-0.25	-0.20	3.50	1.02	22
41	Metalworking and Fabricated Metal Products	-0.04	-0.06	0.44	0.11	19
51	Chemical-Based Products	-0.16	0.49	0.38	0.67	3
52	Mining	0.09	0.58	0.17	0.45	2
53	Paper	-0.07	-0.21	1.19	1.20	23
54	Petroleum and Gas	0.06	0.31	3.59	3.67	6
55	Plastics Products	-0.11	-0.30	1.51	2.85	28
56	Rubber Products	-0.16	0.29	1.94	0.20	8
61	Business Services	0.05	-0.32	4.09	15.75	29
71	Leather Products	-0.27	-0.24	0.36	0.14	25
72	Optical Equipment and Instruments	-0.11	0.06	1.61	0.24	15
73	Textiles and Apparel	-0.32	-0.15	1.00	0.45	21
74	Wood Product and Furniture	-0.15	-0.49	0.06	0.01	30
81	Aluminum and Copper Products	-0.03	-0.22	1.53	0.30	24
91	Feed Products	-0.07	0.23	2.57	5.16	11
92	Packaged Food Products	-0.14	0.04	8.01	1.83	16
101	Hotels and Transportation Services	0.11	0.24	5.37	15.10	10
111	Management, Higher Education and Hospitals	0.34	2.41	5.08	3.82	1
112	Construction	-0.15	0.30	0.86	1.71	7
121	Arts and Media	0.01	-0.56	0.24	0.63	31
131	Financial Services and Insurance	-0.01	0.32	3.10	6.39	5
132	Information Services	-0.20	0.14	1.64	3.21	12
141	Wood Building Products and processing	0.08	-0.11	2.84	2.70	20
151	Breweries and Distilleries	0.03	-0.29	2.50	0.27	27
161	Printing and Publishing	-0.09	0.28	0.45	1.42	9
171	Farming	-0.23	0.00	0.54	0.83	17

Table V.10: Technology Content by Cluster

Cluster Indicators: Technology Content		Employment	Weighted Technology Content	Ranked by
Cluster	Cluster name	Employment 06	Percent in Technology Sectors	Percent in Technology Sectors
11	Computer and Electronic Equipment	800	97.69	2
12	Construction Machinery and Distribution Equipment	316	55.89	4
13	Motor Vehicles	10,506	46.05	6
21	Glass Products	1,457	0.00	16
22	Machine Tools	2,115	6.99	10
31	Concrete, Brick Building Products	411	0.00	16
32	Nondurable Industry Machinery	4,331	3.88	13
41	Metalworking and Fabricated Metal Products	991	21.87	7
51	Chemical-Based Products	271	100.00	1
52	Mining	378	0.00	16
53	Paper	1,520	0.00	16
54	Petroleum and Gas	1,601	0.02	15
55	Plastics Products	1,594	5.32	12
56	Rubber Products	3,433	0.00	16
61	Business Services	15,122	9.88	9
71	Leather Products	424	0.00	16
72	Optical Equipment and Instruments	2,511	6.17	11
73	Textiles and Apparel	1,239	0.00	16
74	Wood Product and Furniture	126	0.00	16
81	Aluminum and Copper Products	1,138	0.00	16
91	Feed Products	10,517	0.00	16
92	Packaged Food Products	2,811	0.00	16
101	Hotels and Transportation Services	12,209	0.00	16
111	Management, Higher Education and Hospitals	14,904	73.88	3
112	Construction	1,939	14.04	8
121	Arts and Media	488	0.00	16
131	Financial Services and Insurance	6,489	0.00	16
132	Information Services	2,533	53.49	5
141	Wood Building Products and processing	2,640	0.00	16
151	Breweries and Distilleries	891	2.57	14
161	Printing and Publishing	2,522	0.00	16
171	Farming	9,164	0.00	16

V.4. Cluster Rankings Based on 30 Performance Indicators

Based on 30 indicators, we ranked 32 clusters in the MTM region. Table V.11 presents the rankings of clusters. The top 10 clusters in the region are (1) management, higher education, and hospitals, (2) motor vehicles, (3) rubber products, (4) chemical-based products, (5) glass products, (6) packages food products, (7) hotels and transportation services, (8) petroleum and gas, (9) mining, and (10) optical equipment and instruments.

In addition to performance rankings of 32 clusters, we also included volume of imports and exports in Table V.11. In chapter VI, we will discuss more about the implications of a large volume of cluster imports for the MTM region. According to Table V.11, two of the largest importing clusters are not among the top 10 performing clusters: nondurable industry machinery and breweries and distilleries. In the target industry section, we will explore further the implications of following important substitution policies for industry clusters in the MTM region.

Table V.11: Performance-Based Cluster Rankings

Cluster	Cluster name	Rank	Import 2006 (million $)	Export 2006 (million$)
111	Management, Higher Education and Hospitals	1	378	863
13	Motor Vehicles	2	725	6,483
56	Rubber Products	3	391	765
51	Chemical-Based Products	4	52	83
21	Glass Products	5	104	199
92	Packaged Food Products	6	299	708
101	Hotels and Transportation Services	7	330	74
54	Petroleum and Gas	8	519	587
52	Mining	9	23	47
72	Optical Equipment and Instruments	10	146	396
151	Breweries and Distilleries	11	319	821
31	Concrete, Brick Building Products	12	42	84
91	Feed Products	13	159	114
131	Financial Services and Insurance	14	198	136
61	Business Services	15	310	207
132	Information Services	16	117	98
53	Paper	17	273	389
141	Wood Building Products and processing	18	208	284
171	Farming	19	42	151
161	Printing and Publishing	20	69	97
11	Computer and Electronic Equipment	21	95	109
32	Nondurable Industry Machinery	22	751	1,097
22	Machine Tools	23	151	290
112	Construction	24	73	91
41	Metalworking and Fabricated Metal Products	25	103	188
55	Plastics Products	26	234	281
71	Leather Products	27	33	59
81	Aluminum and Copper Products	28	230	214
121	Arts and Media	29	25	3
73	Textiles and Apparel	30	130	111
74	Wood Product and Furniture	31	6	2
12	Construction Machinery and Distribution Equipment	32	81	59

VI. FROM REGIONAL CLUSTERS TO TARGET CLUSTERS IN THE MTM REGION

VI.1. Overview

Is the performance ranking of clusters enough for selecting target clusters? Based on extensive review of cluster literature and knowledge about the MTM region, we concluded that performance indicators are necessary but not sufficient for selecting target industries. In fact, the cluster studies are often criticized for picking up clusters performing very well in a region.

In this study we went beyond a performance-based selection process and introduced additional selection criteria to fully (1) capture regional economic dynamics and (2) engage regional leadership in the selection process.

In the sections that follow, we first introduce the additional selection criteria and then introduce details of each target cluster in the MTM region.

VI.2. Target Industry Cluster Selection Criteria

In addition to performance rankings in Chapter V, we used six (6) additional broad indicators to select target clusters. Some of these indicators were already included in the performance rankings but are revisited in this section because of their importance for the MTM region. Selection criteria are:

- cluster depth and specialization,
- gaps in clusters,
- external linkages,
- technology content of a cluster and gaps in technology clusters,
- insights from business surveys and interviews (Chapter IV), and
- local expert feedback.

VI.2.a. Cluster Depth and Specialization

Cluster depth refers to the number of people employed by each cluster. This is especially important because of increasing concern about job losses in the MTM region. In addition, we look at the level of cluster specialization measured as location quotient (LQ). A cluster with a relatively large employment base and high level of specialization suggests that the MTM region has a competitive advantage in that given cluster compared to nation.

VI.2.b. Gaps in the MTM Region's Clusters

This is a critical aspect of target cluster analysis. How and why is this important? The concept of "gaps in cluster" means that a number of industries are part of a national cluster but missing from the MTM region's similar cluster. When targeting clusters, it is important to focus on these missing industries or gaps in clusters. Doing so is likely to

(1) strengthen the supply chain of existing clusters,

(2) bring more jobs to and increase wealth in the MTM region,

(3) increase sectoral diversity of existing MTM clusters,

(4) decrease the cost of production of final goods by bringing industries to the MTM region, and

(5) improve the competitiveness of the clusters and the MTM region.

This study places particular emphasis on the gaps in the MTM region's clusters. A list of industries missing from the MTM region's clusters is provided for each of 32 clusters in "Appendix VI. Gaps in Cluster." We also included a modified version for each of the target clusters below.

VI.2.c. External Linkages

External linkages here refer to imports and exports of each MTM region cluster. Volume of exports plays an important role in the target cluster selection process. This indicator is already included in the performance ranking of the MTM clusters. What we would like to emphasize here is the volume of imports of each MTM region's cluster. The concept of "import substitution" as an economic development strategy is well known in the economic development literature. In the context of regional industry clusters, the following import substitution economic development strategy has multiple benefits:

(1) a significant amount of money remains in the region and is converted to jobs and income;

(2) as in gaps in cluster, targeting industries importing to the region strengthens the supply chain, increases productivity, reduces the cost of production of final goods, and diversifies the region's economy; and

(3) again, as in gaps in cluster, targeting industries importing to the region improves the competitiveness of the region and the clusters.

The presentation labeled "Appendix VI. Commodity Imports by Clusters in the MTM Region" provides a detailed cluster-by-cluster list of commodity imports and dollar amounts.

VI.2.d. Technology Contents of Clusters and Gaps in Technology Clusters

There is a growing emphasis on high-paying technology jobs in the MTM region. In fact, the MTM region has the seeds to grow and attract high-tech firms. By highlighting how the region's clusters are related to national technology clusters, developed by Feser (2005), and which technology clusters and industries are missing from the MTM region, this study helps guide local leadership to select target clusters. The presentation labeled "Appendix VI. Linkages between Regional Clusters and National Technology Clusters" details technology clusters and industries related to the MTM region's clusters and identifies the missing technology clusters and industries.

VI.2.e. Insights from Business Surveys and Interviews

We provided a detailed analysis of business surveys and interviews in Chapter IV. In selecting target clusters for the MTM region, we extensively utilized insights from business surveys and interviews. The presentations labeled "IV. Business Interviews" and "IV. Business Surveys" explore the regional issues concerning industry clusters and factor conditions.

VI.2.f. Local Expert Feedback

We finally solicited expert opinions from economic development officials in the MTM region. These economic development officials were presented all aspects of cluster-related analyses provided so far and asked to identify the top 10 target clusters. After we provided performance-based rankings as well as detailed information about the five (5) criteria explained above, we also asked them to consider their counties' unique characteristics in making decisions on target clusters. We received 12 rankings and then combined them to arrive at the final target clusters. This last process was particularly important because 14 counties in the MTM region represent a diverse set of socioeconomic backgrounds that needs to be factored into the target cluster selection process.

IV.3. TARGET CLUSTERS IN THE MTM REGION

Following the procedure described above, we identified the top 10 clusters (a total of 11 clusters because of a tie for the last spot) as well as two potential clusters. These clusters are

- Motor Vehicle (13),
- Packaged Food Products (92),
- Rubber Products (56),
- Machine Tools (22),
- Metalworking and Fabricated Metal Products (41),
- Plastics Products (55),
- Information Services (132),
- Nondurable Industry Machinery (32),
- Optical Equipment and Instruments (72),
- Computer and Electronic Equipment (11), and
- Breweries and Distilleries (151).

Two potential areas/clusters to be explored are

- Aerospace and Defense and
- R&D Based High Tech/Alternative Energy/Biofuel.

Table VI.1 below presents the top 10 target clusters and their linkages to technology clusters. Table VI.2 shows target clusters from a comparative perspective. The green shade represents target clusters, and the red font indicates the top 10 clusters for a given indicator.

Table VI.1: Target Clusters and Technology Connection

Top 10 Clusters for Targeting Purpose & Potential Clusters

Targeted Clusters (Cluster Number)	Original Ranking Based on Performance	New Ranking Based on Local Feedback	Targeted Clusters and Technology Cluster Connections: Aerospace	Architectural and Engineering Services	Chemicals	Computer and Electronic Equipment	Engine Equipment	Information Services	Medical Instruments and Optics	Motor Vehicles	Pharmaceuticals	Precision instruments	Technical and Research Services	Wiring Devices and Switches
Motor vehicles (13)	2	1	Yes				Yes			Yes				
Rubber Products (56)	3	3												
Packaged Food Products (92)	6	2												
Optical Equipment and Instruments (72)	10	9							Yes					
Breweries and Distilleries (151)	11	10 (Tie)									Yes			
Information Services (132)	16	7		Yes				Yes					Yes	
Computer and Electronic Equipment (11)	21	10 (Tie)				Yes			Yes			Yes		
Nondurable Industry Machinery (32)	22	8					Yes					Yes		Yes
Machine Tools (22)	23	4					Yes							
Metalworking & Fab. Metal Products (41)	25	5												
Plastics Products (55)	26	6			Yes						Yes			

Potential/Emerging Clusters: Clusters in this group has close connections with each other.

Aerospace and Defense

R&D Based High Tech

Alternative Energy/Biofuel

These three research intensive clusters are closely related with each other and other clusters in the region. These clusters require strong enabling clusters in the region, such as, business and financial services and management and higher education. One critical aspect of these clusters is that the region should have strong research centers supported by industry, higher education and government. University of Alabama at Huntsville, UT Space Institute in Coffee County, MTSU in Rutherford County have already established programs that could be expanded for this purpose.

Note 1: New cluster ranking is based on the responses from 10 counties, Middle Tennessee Industrial Board Association (MTIDA) and Business and Economic Research Center at MTSU.

Note 2: Rankings primarily based on cluster performance indicators, cluster gap analysis, cluster-technology connections, cluster imports, and local knowledge.

Table VI.2. Target Clusters (Green Shade) and Selected Indicators

TARGET CLUSTERS AND TOP 10 CLUSTERS FOR EACH PERFORMANCE INDICATOR

Cluster Indicators: Employment		Employment		Compensation	Value Added	Productivity	Exports	Imports	Competitiveness		Linkage		Tech	Performance
Cluster	Cluster name	2006	LQ2006	C2006	VA2006	PRO2006	E2006(million $)	2006 (million $)	Industry Mix (IM)	Regional Shift (RS)	Buy	Sell	Share	Rank
11	Computer and Electronic Equipment	800	1.48	$45,456	$49,455	$207,664	109	95	-0.12	0.13	0.60	0.80	97.69	21
12	Construction Machinery and Distribution Equipment	316	1.02	$54,455	$89,292	$403,208	59	81	0.14	-1.04	0.35	0.17	55.89	32
13	Motor Vehicles	10,506	7.69	$89,430	$135,460	$870,985	6,483	725	-0.15	-0.03	32.08	15.55	46.05	2
21	Glass Products	1,457	5.10	$38,958	$77,593	$199,903	199	104	-0.18	0.45	1.40	1.63	0.00	5
22	Machine Tools	2,115	2.05	$48,035	$90,972	$187,103	290	151	-0.04	-0.28	1.00	1.65	6.99	23
31	Concrete, Brick Building Products	411	1.18	$42,019	$85,570	$228,431	84	42	0.04	0.13	0.32	0.01	0.00	12
32	Nondurable Industry Machinery	4,331	4.94	$47,688	$68,107	$284,306	1,097	751	-0.25	-0.20	3.50	1.02	3.88	22
41	Metalworking and Fabricated Metal Products	991	1.36	$38,281	$63,004	$190,537	188	103	-0.04	-0.06	0.44	0.11	21.87	25
51	Chemical-Based Products	271	1.91	$87,714	$172,923	$437,097	83	52	-0.16	0.49	0.38	0.67	100.00	4
52	Mining	378	0.96	$54,076	$112,569	$198,074	47	23	0.09	0.58	0.17	0.45	0.00	9
53	Paper	1,520	3.02	$57,299	$85,804	$306,267	389	273	-0.07	-0.21	1.19	1.20	0.00	17
54	Petroleum and Gas	1,601	0.87	$48,126	$139,357	$582,130	587	519	0.06	0.31	3.59	3.67	0.02	8
55	Plastics Products	1,594	2.30	$45,390	$95,930	$292,389	281	234	-0.11	-0.30	1.51	2.85	5.32	26
56	Rubber Products	3,433	8.23	$52,085	$85,644	$229,201	765	391	-0.16	0.29	1.94	0.20	0.00	3
61	Business Services	15,122	0.58	$32,015	$56,627	$91,546	207	310	0.05	-0.32	4.09	15.75	9.88	15
71	Leather Products	424	3.33	$47,491	$58,097	$180,018	59	33	-0.27	-0.24	0.36	0.14	0.00	27
72	Optical Equipment and Instruments	2,511	7.98	$42,775	$88,791	$180,629	396	146	-0.11	0.06	1.61	0.24	6.17	10
73	Textiles and Apparel	1,239	2.32	$29,565	$52,351	$200,420	111	130	-0.32	-0.15	1.00	0.45	0.00	30
74	Wood Product and Furniture	126	0.71	$39,475	$84,759	$158,376	2	6	-0.15	-0.49	0.06	0.01	0.00	31
81	Aluminum and Copper Products	1,138	2.41	$57,658	$80,632	$354,190	214	230	-0.03	-0.22	1.53	0.30	0.00	28
91	Feed Products	10,517	4.04	$2,825	$9,783	$37,832	114	159	-0.07	0.23	2.57	5.16	0.00	13
92	Packaged Food Products	2,811	2.68	$40,331	$69,443	$326,121	708	299	-0.14	0.04	8.01	1.83	0.00	6
101	Hotels and Transportation Services	12,209	0.61	$18,411	$67,618	$117,816	74	330	0.11	0.24	5.37	15.10	0.00	7
111	Management, Higher Education and Hospitals	14,904	1.43	$36,541	$47,477	$90,981	863	378	0.34	2.41	5.08	3.82	73.88	1
112	Construction	1,939	1.08	$20,978	$41,858	$119,940	91	73	-0.15	0.30	0.86	1.71	14.04	24
121	Arts and Media	488	0.17	$27,483	$39,460	$117,929	3	25	0.01	-0.56	0.24	0.63	0.00	29
131	Financial Services and Insurance	6,489	0.58	$33,092	$84,713	$140,595	136	198	-0.01	0.32	3.10	6.39	0.00	14
132	Information Services	2,533	0.41	$46,336	$87,762	$168,069	98	117	-0.20	0.14	1.64	3.21	53.49	16
141	Wood Building Products and Processing	2,640	2.14	$25,809	$49,682	$185,440	284	208	0.08	-0.11	2.84	2.70	0.00	18
151	Breweries and Distilleries	891	2.43	$68,741	$401,954	$908,002	821	319	0.03	-0.29	2.50	0.27	2.57	11
161	Printing and Publishing	2,522	1.44	$34,315	$45,746	$82,658	97	69	-0.09	0.28	0.45	1.42	0.00	20
171	Farming	9,164	5.19	$3,592	$15,562	$23,346	151	42	-0.23	0.00	0.54	0.83	0.00	19

Legend: **Green Shade:** Target Clusters **Red Font:** Top 10 Clusters for Each Performance Indicator

VI.3.a. Holistic View of Inter-Cluster Linkages and Status of Target Clusters

Throughout this study, we emphasized industry clusters and their components. In the process, we identified 32 sub-clusters, exclusive of purely local clusters. However, we should note that none of these clusters operates in a vacuum. For one thing, in order for these clusters to perform and sustain themselves, a region should have critical foundations, which I call in this study "mega foundations," such as

- physical infrastructure,
- human resources, and
- technology infrastructure.

These three mega foundations are absolutely necessary and must be continuously upgraded for a region and its clusters to thrive in a globalized competitive economy.

The second layer of clusters, which are necessary to sustain business demands and perform essential services to businesses and communities alike, includes purely local businesses and government services, including K-12 education. This layer of clusters interacts closely with other basic clusters and should be responsive to the demands of businesses and communities. We may also closely tie quality of life in a region to the proper functioning of this layer of clusters.

The third layer of clusters feeds both the second and fourth layers. This set of clusters also has membership in the fourth layer. A critical aspect of this layer of clusters is that they provide goods and services that are essential for the proper functioning of a region's economy in the 21st century. A competitive regional economy can successfully be sustained if the region has necessary "enabling" and "technology" sectors.

Finally, the fourth layer comprises clusters that produce goods and services exported outside the region. These clusters are often called "basic" clusters. Important features of these clusters are that they have high productivity and export a significant percent of what they produce. Their competitiveness very much depends on the strength of enabling and technology centers specified above as well as quality of mega foundations.

Chart VI.1 below presents these layers and schematizes how we arrive at target clusters considering these layers of clusters in the MTM economy. After this chart, Figure VI.1 provides a detailed picture of the status of each target cluster in the MTM region. For practical purposes, we fit clusters into one of four status categories that are common in regional industry analyses:

(1) the STAR status is given to a cluster with a larger than "1" employment specialization ratio (LQ) ***and*** an increase in specialization ratio compared to a reference year;

(2) the MATURE status represents those clusters with a larger than "1" employment specialization ratio (LQ) ***but*** a decrease in specialization ratio compared to a reference year;

(3) the TRANSFORMING status means that a cluster has a less than "1" specialization ratio ***and*** a decline in specialization ratio compared to a reference year; and

(4) the EMERGING status represents a cluster with a less than "1" LQ ***but*** an increase in LQ compared to a reference year.

Figure VI.1 also gives current employment size (bubble size) of each target cluster as well as the cluster number (in parentheses).

Chart VI.1. Inter-Cluster Linkages and Target Clusters

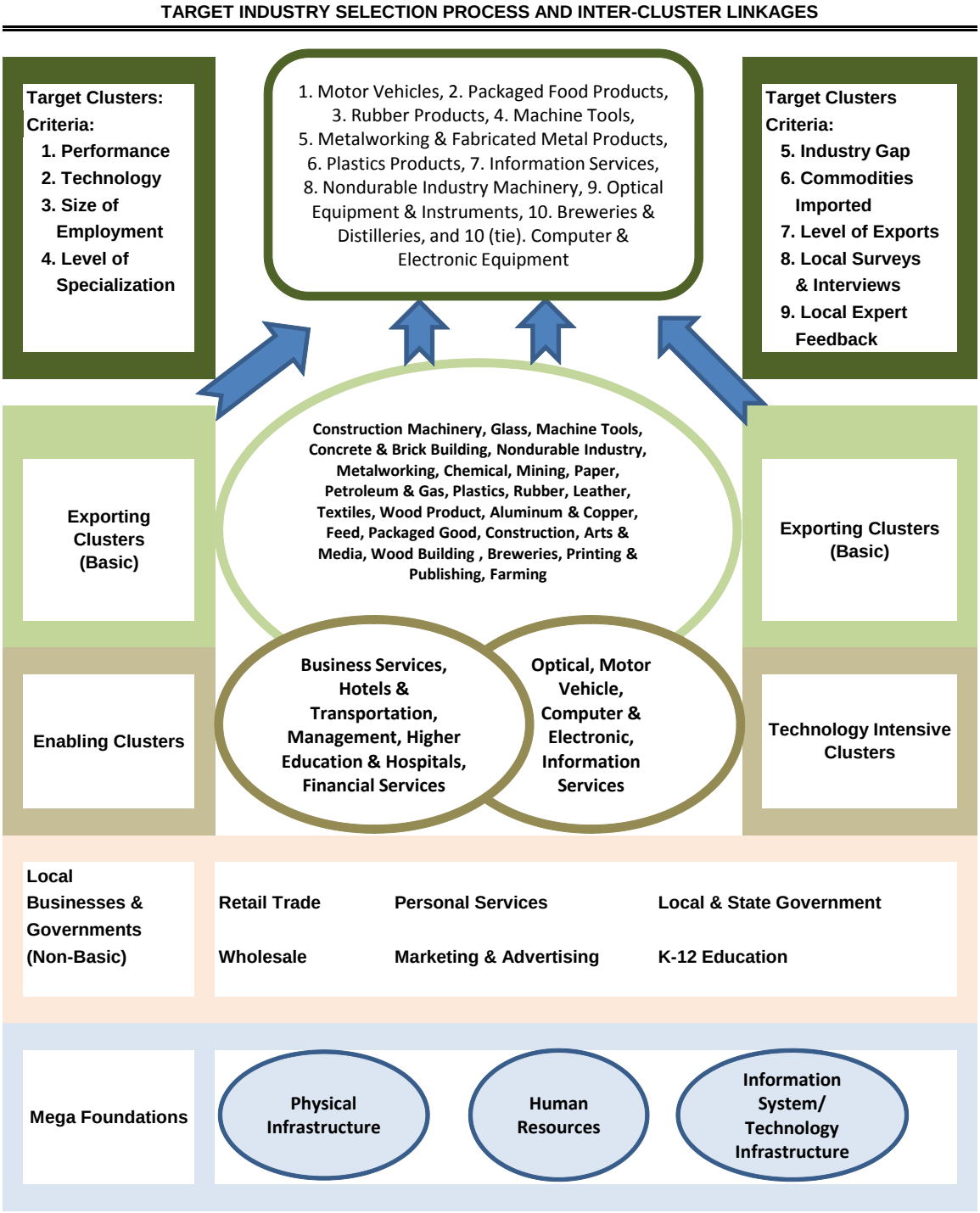
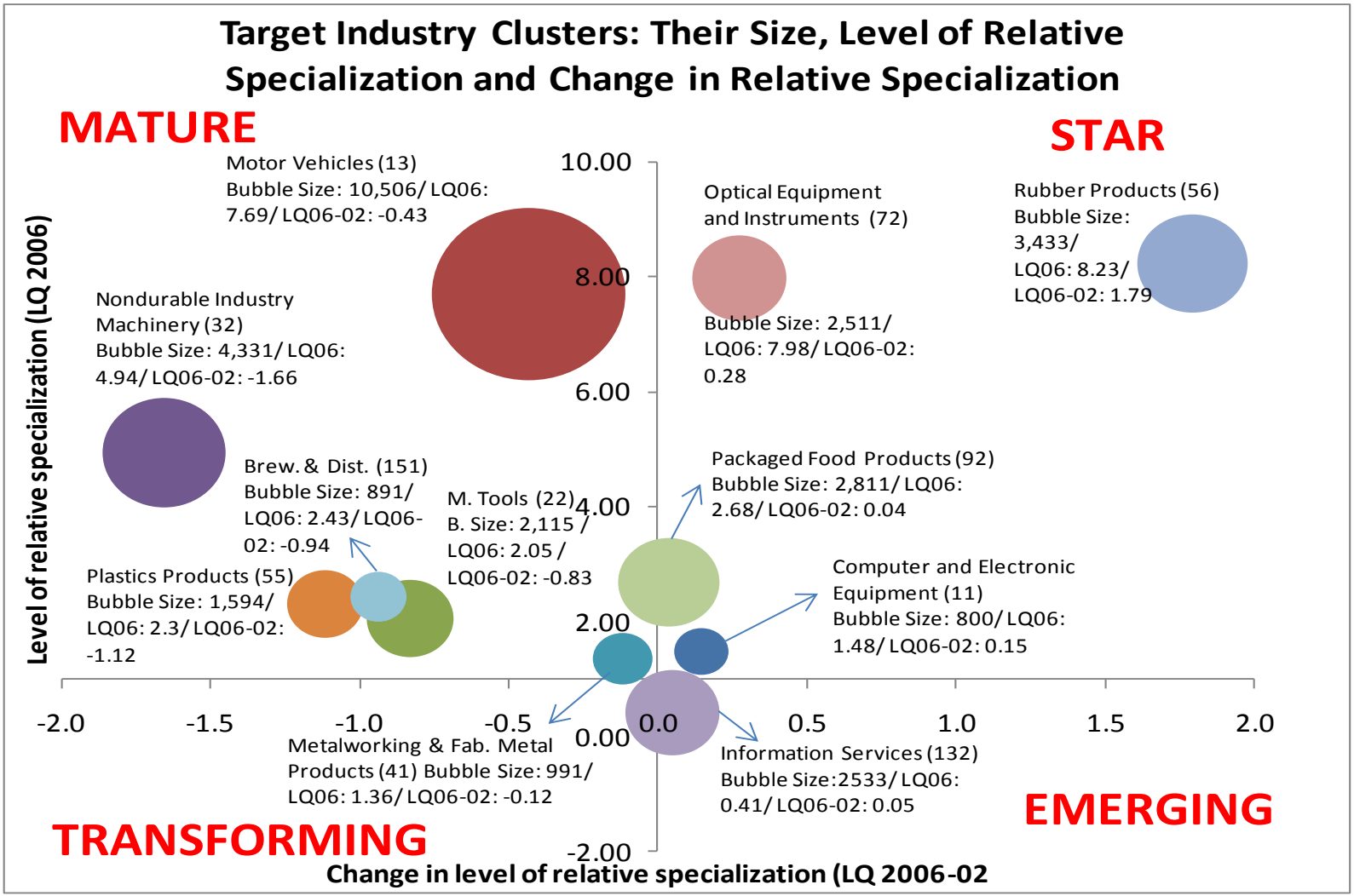


Figure VI.1: Status of Target Clusters in the MTM Region



VI.3.b. Industry Clusters in the MTM Region: A Detailed Profile

This part of the study introduces a detailed profile of target clusters in the MTM region. What follow are three sets of cluster information:

(1) cluster vital signs (***table***),

(2) cluster employment concentration in the MTM region and the Nashville MSA by County (***map***), and

(3) summary guide to understanding each cluster and cluster development initiative strategies (***chart***).

We repeat this sequence of information for each of 11 target clusters identified in this analysis. In order to follow the information in the charts, a brief guide is provided in Chart VI.2 below.

Chart VI.2: Guide to Reading Cluster Charts

A =Cluster Profile and Performance Indicators

B Industries Selling Goods and Services to Cluster (**C**) in the MTM Region	**C** Industries that are Present in the MTM Region and Core Part of the Given Cluster	**D** Industries Buying Goods and Services from Cluster (**C**) in the MTM Region
E Major Commodities Imported by Cluster (**C**) in the MTM Region and Their Dollar Value	**F** Industries that are Missing from Cluster (**C**) in the MTM Region. These Missing Industries are Part of the Same Cluster at National Level	**G** Major Occupations Employed by Cluster (**C**) in the MTM Region

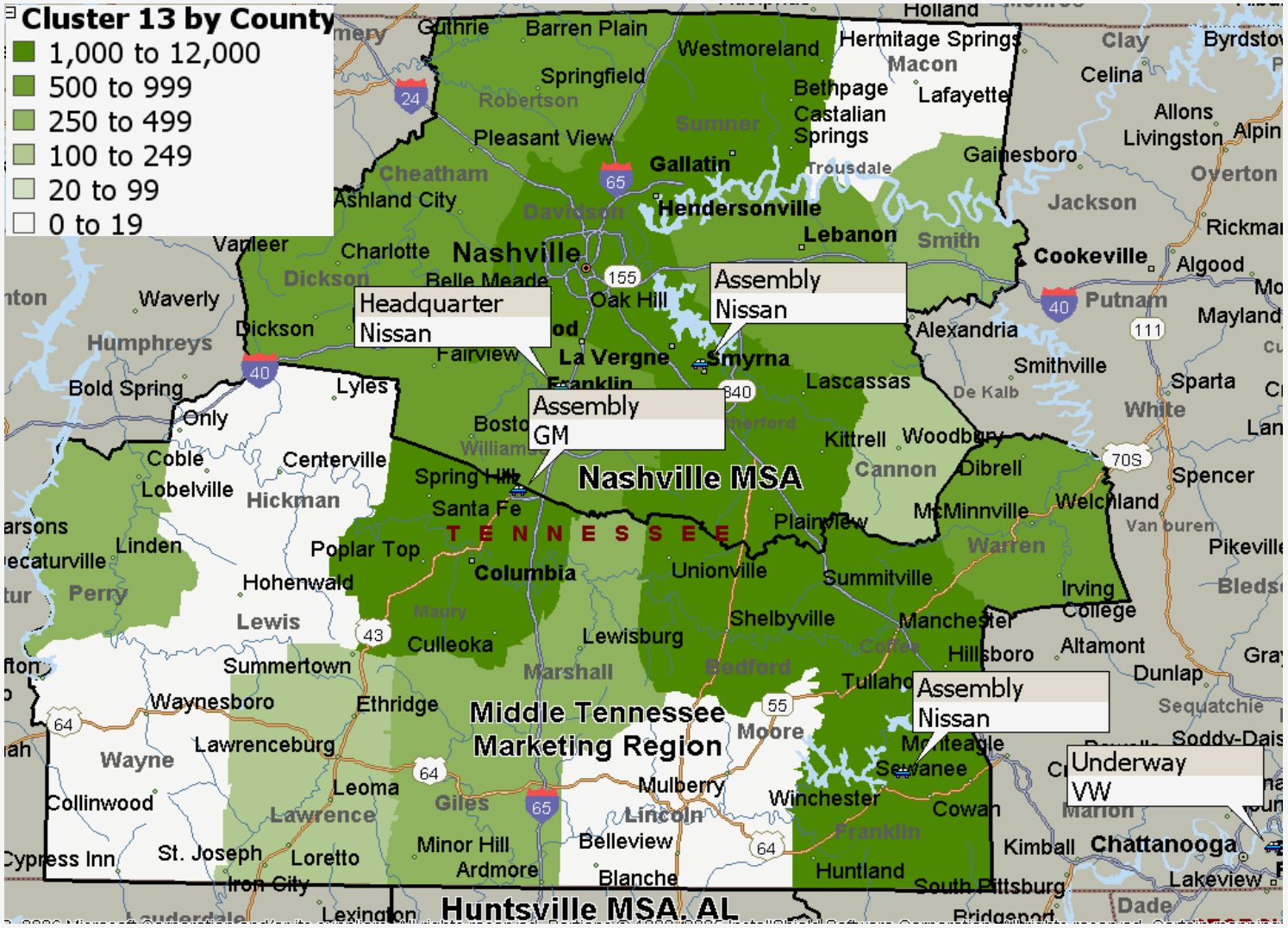
MOTOR VEHICLE CLUSTER (13): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Motor Vehicle Cluster (13)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	10,506	Cluster employment
E Change 2002-06	-9.36%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	7.69	Higher concentration
LQ2006-2002	-0.43	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$89,430	Compensation per employment
Region's C as % of U.S.	110.73%	Significantly higher than U.S.
Change in C 2006-2002 (%)	13.37%	Positive Growth
Productivity (PRO)		
PRO 2006	$870,985	Productivity
Change in PRO 2006-2002 (%)	52.48%	Strong positive trend
Region's PRO as % of U.S.	162.58%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$6,483	Total Export
EX as % of Output	70.85%	Exports sizable share of output
EX as % of Region's EX	41.70%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$6,031	Total Imports
Industry Mix Effect on Employment Growth	-15%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	-3%	Negative/neutral locational advantage
Technology Sectors (%)	46.05%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF MOTOR VEHICLE CLUSTER (13): REGION AND BEYOND


Cluster 13 by County
1,000 to 12,000
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Headquarter
Nissan
Assembly
Nissan
Assembly
GM
Assembly
Nissan
Underway
VW
Nashville MSA
Middle Tennessee
Marketing Region
Huntsville MSA, AL
TENNESSEE
Nashville
Columbia
Murfreesboro
Smyrna
La Vergne
Franklin
Spring Hill
Gallatin
Hendersonville
Lebanon
Cookeville
Clarksville
Chattanooga
Sewanee
Winchester
Manchester
McMinnville
Shelbyville
Lewisburg
Tullahoma
Fayetteville
Pulaski
Dickson
Waverly
Charlotte
Ashland City
Pleasant View
Springfield
Portland
Gallatin
Hartsville
Carthage
Lebanon
Watertown
Mount Juliet
Smithville
Sparta
Cookeville
Jamestown
Livingston
Celina
Byrdstown
Algood
Monterey
Crossville
Oneida
Huntsville
Jasper
Kimball
Dunlap
Soddy-Daisy
Sequatchie
Pikeville
Spencer
Dibrell
Woodbury
Kittrell
Lascassas
Alexandria
Gainesboro
Trousdale
Macon
Hermitage Springs
Westmoreland
Barren Plain
Guthrie
Holland
Clay
Jackson
Overton
Putnam
White
Cannon
Warren
Coffee
Bedford
Marshall
Maury
Lewis
Wayne
Lawrence
Giles
Lincoln
Moore
Franklin
Hickman
Perry
Humphreys
Dickson
Cheatham
Robertson
Sumner
Smith
Jackson
Putnam
Overton
Fentress
Scott
Morgan
Roane
Rhea
Meigs
Bledsoe
Sequatchie
Marion
Hamilton
Bradley
Polk
Cumberland
Van Buren
Grundy
Coffee
Lincoln
Moore
Franklin
Giles
Lawrence
Wayne
Hickman
Perry
Lewis
Maury
Marshall
Bedford
Cannon
Warren
Coffee
Van Buren
Grundy
Sequatchie
Bledsoe
Rhea
Meigs
Roane
Morgan
Scott
Fentress
Cumberland
Polk
Bradley
Hamilton
Marion
Franklin
Lincoln
Moore

TARGET INDUSTRY CLUSTER: MOTOR VEHICLE CLUSTER (13)

Cluster Number: 13
Cluster Name: Motor Vehicle
Cluster Status: STAR/MATURE (Highly Concentrated with Slight Decrease)
Technology Content: Semi-Technology-Intensive

Number of Establishments: 48 (2007 Q1)
Average Wage: $54,157 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 11,544 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 13

B

- Motor vehicle parts manufacturing
- Wholesale trade
- Automotive repair and maintenance, except car washes
- Truck transportation
- Glass and glass products, except glass containers
- Automobile and light truck manufacturing

Major Industries in Motor Vehicle Cluster (13)

C

- Automobile and light truck manufacturing
- Motor vehicle body manufacturing
- Travel trailer and camper manufacturing
- Motor vehicle parts manufacturing
- Other aircraft parts and equipment
- Boat building

Major Industries Purchasing Goods and Services from Cluster 13

D

- Automobile and light truck manufacturing
- Motor vehicle parts manufacturing
- Automotive repair and maintenance, except car washes
- Truck transportation
- Waste management and remediation services
- Lawn and garden equipment manufacturing

E

MAJOR COMMODITIES IMPORTED BY CLUSTER 13

Commodities Imported	Million $
Motor vehicle parts manufacturing	$3,441.25
Wholesale trade	$270.45
Iron and steel mills	$182.35
Semiconductors and related device manufacturing	$149.90
Other engine equipment manufacturing	$133.36
Audio and video equipment manufacturing	$113.14
Management of companies and enterprises	$98.37
All other miscellaneous professional and technical	$91.78
Automotive repair and maintenance- except car wash	$86.95
Tire manufacturing	$68.91
Lessors of nonfinancial intangible assets	$66.93
Motor vehicle body manufacturing	$58.91
Ferrous metal foundaries	$46.41
Paint and coating manufacturing	$45.91
Turned product and screw- nut- and bolt manufactur	$45.31
Aluminum foundries	$41.52

F

MISSING INDUSTRIES FROM CLUSTER 13

- Audio & video equip manf
- Electric lamp bulb and part manufacturing
- Heavy duty truck manf
- Truck trailer manf
- Motorcycle, bicycle, & parts manf
- All other transport equip manf

G

MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 13

- General and Operations Managers
- Computer Software Engineers, Applications
- Computer Hardware Engineers
- Electrical Engineers
- Electronics Engineers, Except Computer
- Engineers, All Other
- First-Line Supervisors/Managers of Production and Operating
- Electrical and Electronic Equipment Assemblers
- Assemblers and Fabricators, All Other
- Computer-Controlled Machine Tool Operators, Metal and Plasti
- Numerical Tool and Process Control Programmers
- Cutting, Punching, and Press Machine Setters, Operators, and
- Machinists

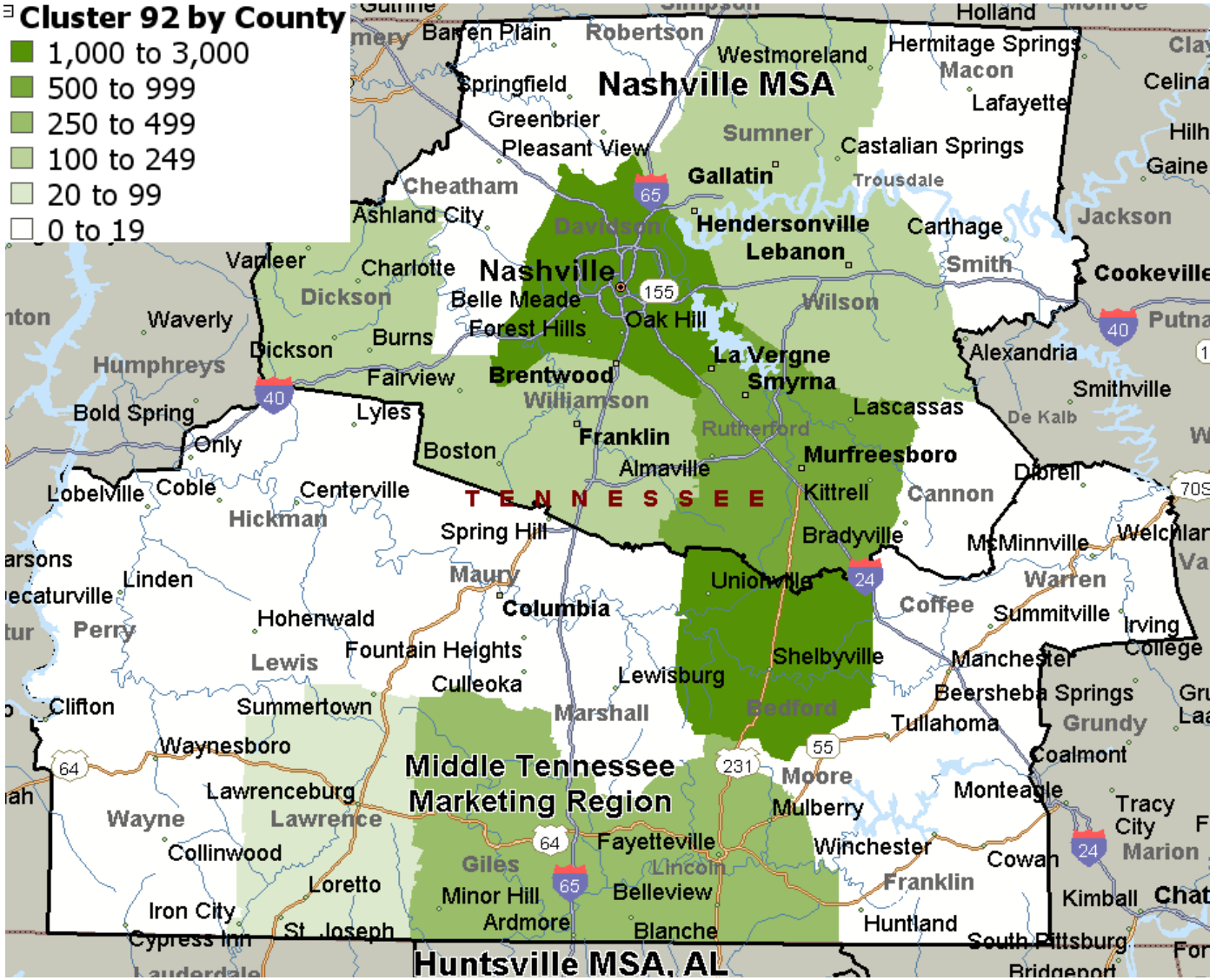
PACKAGED FOOD PRODUCTS CLUSTER (92): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Packaged Food Products Cluster (92)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	2,811	Cluster employment
E Change 2002-06	-1.98%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.68	Higher concentration
LQ2006-2002	0.04	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$40,331	Compensation per employment
Region's C as % of U.S.	102.23%	Higher than U.S.
Change in C 2006-2002 (%)	21.65%	Strong Positive Growth
Productivity (PRO)		
PRO 2006	$326,121	Productivity
Change in PRO 2006-2002 (%)	87.58%	Strong positive trend
Region's PRO as % of U.S.	111.04%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$708	Total Export
EX as % of Output	77.21%	Exports sizable share of output
EX as % of Region's EX	4.55%	Important player in the region
Imports (IM)		
IM 2006 (Million $)	$299	Total Imports
Industry Mix Effect on Employment Growth	-14%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	4%	Positive locational advantage
Technology Sectors (%)	0.00%	Contains no technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF PACKAGED FOOD PRODUCTS CLUSTER (92): REGION AND BEYOND


Cluster 92 by County
1,000 to 3,000
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Nashville MSA
Middle Tennessee Marketing Region
Huntsville MSA, AL
TENNESSEE
Nashville
Hendersonville
Lebanon
Gallatin
Franklin
Brentwood
Murfreesboro
Smyrna
La Vergne
Columbia
Shelbyville
Lewisburg
Fayetteville
Springfield
Greenbrier
Pleasant View
Ashland City
Cheatham
Dickson
Waverly
Humphreys
Bold Spring
Only
Lobelville
Coble
Centerville
Hickman
Spring Hill
Maury
Marshall
Bedford
Giles
Lincoln
Lawrence
Wayne
Lewis
Perry
Hohenwald
Fountain Heights
Culleoka
Summertown
Waynesborough
Lawrenceburg
Collinwood
Loretto
Iron City
Cypress Inn
St. Joseph
Minor Hill
Ardmore
Belleview
Blanche
Huntland
Franklin
Winchester
Mulberry
Moore
Coffee
Warren
Summitville
Manchester
Beersheba Springs
Tullahoma
Coalmont
Grundy
Monteagle
Tracy City
Marion
Kimball
Cowan
Sumner
Trousdale
Castalian Springs
Wilson
Lafayette
Macon
Hermitage Springs
Westmoreland
Robertson
Barren Plain
Davidson
Williamson
Rutherford
Cannon
DeKalb
Smith
Jackson
Putnam
Cookeville
Alexandria
Smithville
Lascassas
Murfreesboro
Kittrell
Almaville
Boston
Lyles
Burns
Fairview
Belle Meade
Forest Hills
Oak Hill
Charlotte
Vanleer
Carthage
Holland
Celina
Gaines
Hilham
Irving College
Welchlar
McMinnville
Bradyville
Unionville
Linden
Perry
Clifton
Waynesboro
Lawrenceburg
Collinwood
Loretto
Iron City
Cypress Inn
St. Joseph
Minor Hill
Ardmore
Belleview
Blanche
Huntland
Franklin
Winchester
Mulberry
Moore
Coffee
Warren
Summitville
Manchester
Beersheba Springs
Tullahoma
Coalmont
Grundy
Monteagle
Tracy City
Marion
Kimball
Cowan
Sumner
Trousdale
Castalian Springs
Wilson
Lafayette
Macon
Hermitage Springs
Westmoreland
Robertson
Barren Plain
Springfield
Greenbrier
Pleasant View
Ashland City
Cheatham
Dickson
Waverly
Humphreys
Bold Spring
Only
Lobelville
Coble
Centerville
Hickman
Spring Hill
Maury
Marshall
Bedford
Giles
Lincoln
Lawrence
Wayne
Lewis
Perry
Hohenwald
Fountain Heights
Culleoka
Summertown
Waynesborough

TARGET INDUSTRY CLUSTER: PACKAGED GOODS PRODUCTS CLUSTER (92)

Cluster Number: 92
Cluster Name: Packaged Goods Products
Cluster Status: STAR (Highly Concentrated with Increase)
Technology Content: None

Number of Establishments: 22 (2007 Q1)
Average Wage: $33,717 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1 **A**
Total Employment: 3,188 (2007 Q1)

Major Industries Selling Goods and Services to Cluster 92	Major Industries in Packaged Goods Products Cluster (92)	Major Industries Purchasing Goods and Services from Cluster 92
Poultry and egg production	Confectionery manufacturing from purcha	Poultry processing
Poultry processing	Animal- except poultry- slaughtering	Food services and drinking places
Cattle ranching and farming	Meat processed from carcasses	Leather and hide tanning and finishing
Wholesale trade	Poultry processing	Animal, except poultry, slaughtering
Truck transportation	Bread and bakery product- except frozen	Other snack food manufacturing
Animal production, except cattle and poultry and eggs	Other snack food manufacturing	Toilet preparation manufacturing
Plastics packaging materials, film and sheet	Mayonnaise- dressing- and sauce manufac	
	All other food manufacturing	

B **C** **D**

E **F** **G**

MAJOR COMMODITIES IMPORTED BY CLUSTER 92

Commodities Imported	Million $
Management of companies and enterprises	$57.55
Wholesale trade	$46.28
Poultry and egg production	$17.29
Paperboard container manufacturing	$16.82
Fats and oils refining and blending	$10.50
Grain farming	$9.17
All other miscellaneous professional and technical	$8.85
Plastics pipe- fittings- and profile shapes	$8.77
Flour milling	$8.75
Petroleum refineries	$7.12
Coated and laminated paper and packaging materials	$6.98
Metal can- box- and other container manufacturing	$5.09
Warehousing and storage	$4.88
Natural gas distribution	$4.54

MISSING INDUSTRIES FROM CLUSTER 92

- Breakfast cereal manf
- Coffee & tea manf
- Confectionery manf from cacao beans
- Cookie & cracker manf
- Dry pasta manf
- Fats & oils refining & blending
- Flavoring syrup & concentrate manf
- Frozen cakes & other pastries manf
- Frozen food manf
- Mixes & dough made from purchased flour
- Nonchocolate confectionery manf
- Roasted nuts & peanut butter manf
- Seafood product preparation and packaging
- Spice & extract manf
- Tortilla manf

MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 92

- Bakers
- First-Line Supervisors/Managers of Production and Operating
- Food Preparation Workers
- Industrial Truck and Tractor Operators
- Inspectors, Testers, Sorters, Samplers, and Weighers
- Janitors and Cleaners, Except Maids and Housekeeping Cleaner
- Maintenance Workers, Machinery
- Packaging and Filling Machine Operators and Tenders
- Packers and Packagers, Hand

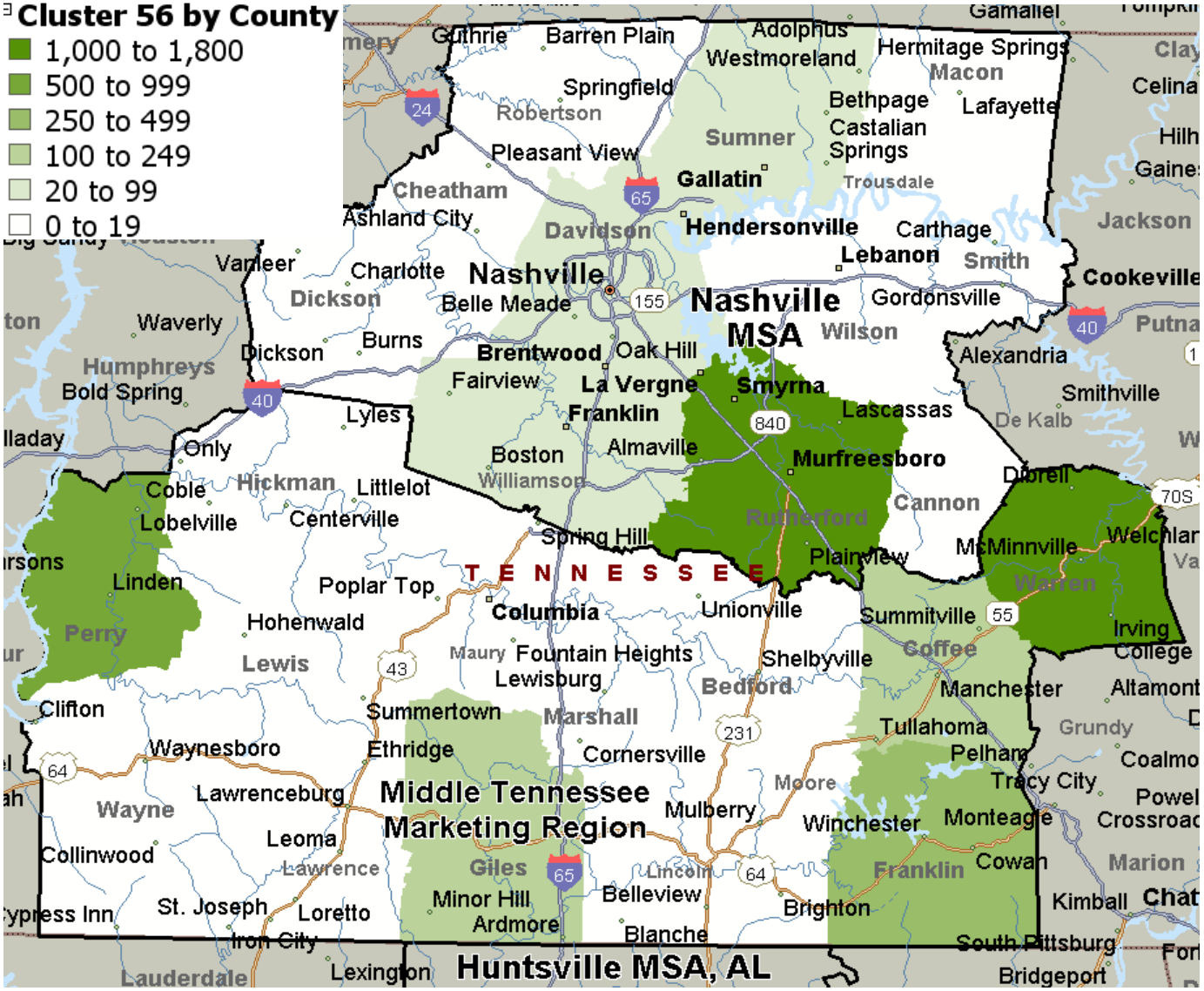
RUBBER PRODUCTS CLUSTER (56): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Rubber Products Cluster (56)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	3,433	Cluster employment
E Change 2002-06	20.83%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	8.23	Higher concentration
LQ2006-2002	1.79	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$52,085	Compensation per employment
Region's C as % of U.S.	99.50%	U.S. Average
Change in C 2006-2002 (%)	30.78%	Strong Positive Growth
Productivity (PRO)		
PRO 2006	$229,201	Productivity
Change in PRO 2006-2002 (%)	44.73%	Strong positive trend
Region's PRO as % of U.S.	106.53%	Higher than U.S.
Export (EX)		
EX 2006 (Million $)	$765	Total Export
EX as % of Output	97.17%	Exports sizable share of output
EX as % of Region's EX	4.92%	Important player in the region
Imports (IM)		
IM 2006 (Million $)	$391	Total Imports
Industry Mix Effect on Employment Growth	-16%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	29%	Positive locational advantage
Technology Sectors (%)	0.00%	Contains no technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF RUBBER PRODUCTS CLUSTER (56): REGION AND BEYOND


Cluster 56 by County
1,000 to 1,800
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Middle Tennessee Marketing Region
Nashville MSA
Huntsville MSA, AL
TENNESSEE
Nashville
Murfreesboro
Columbia
Smyrna
La Vergne
Franklin
Brentwood
Hendersonville
Gallatin
Lebanon
Springfield
Clarksville
Shelbyville
Manchester
Tullahoma
Winchester
Cookeville
Sumner
Davidson
Rutherford
Williamson
Wilson
Cannon
Bedford
Coffee
Franklin
Giles
Lincoln
Marshall
Maury
Lewis
Perry
Wayne
Hickman
Dickson
Cheatham
Robertson
Macon
Jackson
Smith
Putnam
DeKalb
Warren
Grundy
Marion
Moore
Lawrence
Montgomery
Guthrie
Barren Plain
Adolphus
Westmoreland
Hermitage Springs
Bethpage
Lafayette
Castalian Springs
Trousdale
Pleasant View
Ashland City
Carthage
Gordonsville
Alexandria
Smithville
Lascassas
Murfreesboro
Dibrell
McMinnville
Irving College
Summitville
Unionville
Plainview
Spring Hill
Boston
Almaville
Fairview
Oak Hill
Belle Meade
Charlotte
Vanleer
Waverly
Burns
Humphreys
Bold Spring
Lyles
Only
Coble
Lobelville
Centerville
Linden
Poplar Top
Hohenwald
Fountain Heights
Lewisburg
Summertown
Ethridge
Waynesboro
Lawrenceburg
Leoma
Collinwood
Cypress Inn
St. Joseph
Loretto
Iron City
Lauderdale
Lexington
Minor Hill
Ardmore
Blanche
Belleview
Brighton
Cowan
Tracy City
Monteagle
Pelham
Coalmont
Altamont
Kimball
South Pittsburg
Bridgeport
Cornersville
Mulberry
Gamaliel
Celina
Hilham
Gaines
Putnam
Welchland
Va
Fort
Chat
Ton
Iladay
Irsons
Ur
Ah
Cypress Inn
Big Sandy
Houston
Clay
Powell
Crossroads
Altamont
Grundy
Coalmont
Tracy City
Pelham
Tullahoma
Manchester
Shelbyville
Unionville
Summitville
Irving College
McMinnville
Dibrell
Smithville
Alexandria
Lebanon
Carthage
Hendersonville
Gallatin
Springfield
Adolphus
Guthrie
Barren Plain
Hermitage Springs
Macon
Lafayette
Bethpage
Castalian Springs
Trousdale
Pleasant View
Ashland City
Cheatham
Robertson
Sumner
Davidson
Rutherford
Williamson
Wilson
Cannon
Bedford
Coffee
Franklin
Giles
Lincoln
Marshall
Maury
Lewis
Perry
Wayne
Hickman
Dickson

TARGET INDUSTRY CLUSTER: RUBBER PRODUCTS CLUSTER (56)

Cluster Number: 56
Cluster Name: Rubber Products
Cluster Status: STAR (Highly Concentrated with Increase)
Technology Content: None

Number of Establishments: 11 (2007 Q1)
Average Wage: $64,532 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 2,761 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 56	Major Industries in Rubber Products Cluster (56)	Major Industries Purchasing Goods and Services from Cluster 56
Truck transportation	Tire manufacturing	Automobile and light truck manufacturing
Wholesale trade	Rubber and plastics hose and belting ma	Motor vehicle parts manufacturing
Other basic inorgamic chemical manufacturing	Other rubber product manufacturing	Glass and glass products, except glass containers
Textile and fabric finishing mills	Kitchen utensil- pot- and pan manufactu	AC, refrigeration, and forced air heating
Plastic material and resin manufacturing	Sporting and athletic goods manufacturi	Other snack food manufacturing
Architectural and engineering services	Gasket- packing- and sealing device man	Tire manufacturing
Power generation and supply	Buttons- pins- and all other miscellane	

B **C** **D**

E

MAJOR COMMODITIES IMPORTED BY CLUSTER 56

Commodities Imported	Million $
Synthetic rubber manufacturing	$78.58
Tire cord and tire fabric mills	$29.83
Forest nurseries- forest products- and timber trac	$26.19
Plastics material and resin manufacturing	$25.16
Other rubber product manufacturing	$21.18
Other basic organic chemical manufacturing	$19.99
Wholesale trade	$18.57
Management of companies and enterprises	$17.38
Iron and steel mills	$10.21
Steel wire drawing	$9.71
All other miscellaneous professional and technical	$8.97

F

MISSING INDUSTRIES FROM CLUSTER 56

- Photographic film & chemical manf
- Other ordnance & accessories manf
- Ammunition manf
- Storage battery manf
- Primary battery manf
- Dental equip & supplies manf

G

MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 56

- Assemblers and Fabricators, All Other
- Art and Design Workers, All Other (OES Only)
- First-Line Supervisors/Managers of Production and Operating
- Helpers--Production Workers
- Material Moving Workers, All Other
- Packers and Packagers, Hand
- Paper Goods Machine Setters, Operators, and Tenders
- Printing Machine Operators
- Sales Representatives, Wholesale and Manufacturing, Technica
- Shipping, Receiving, and Traffic Clerks

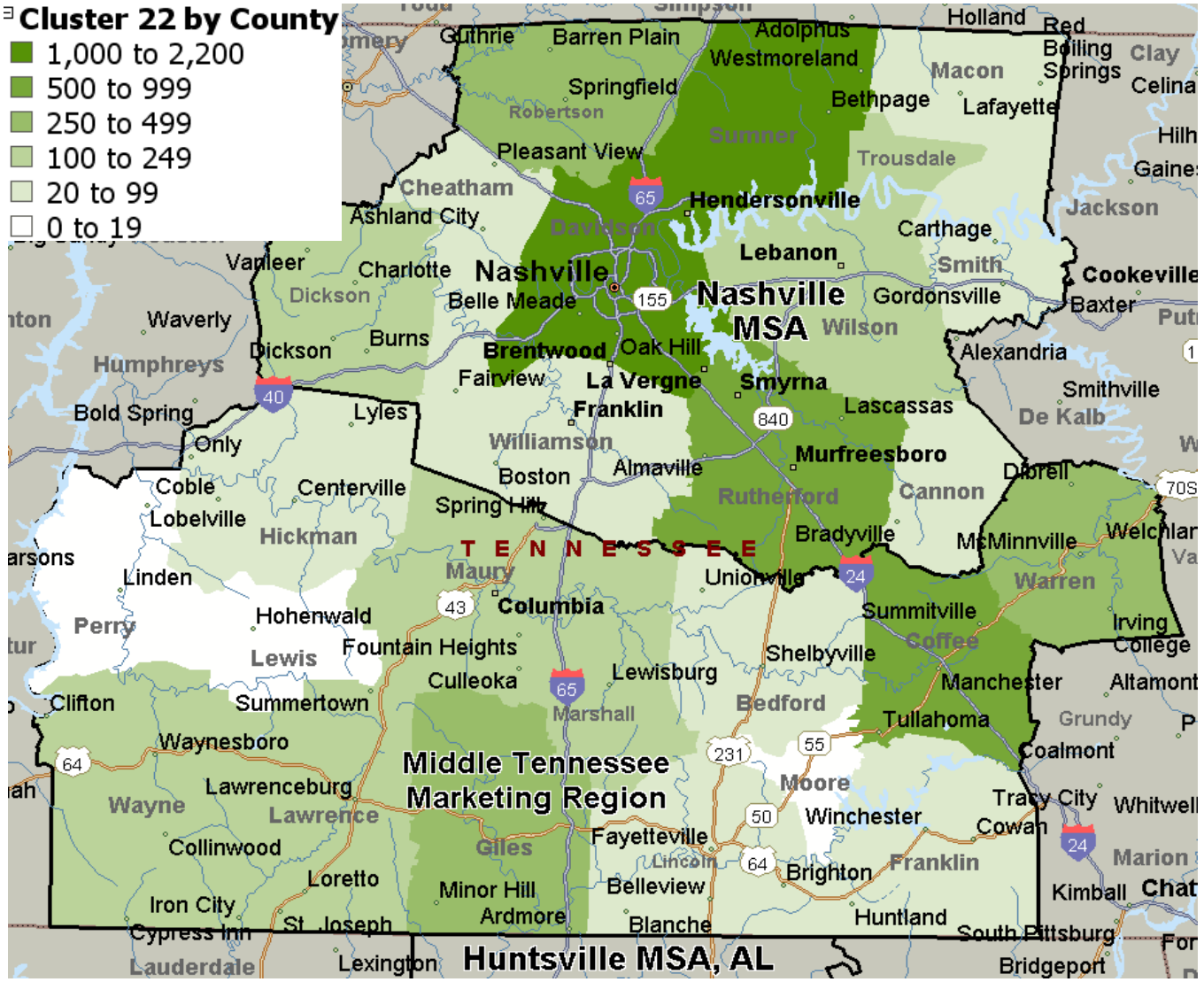
MACHINE TOOLS CLUSTER (22): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Machine Tools Cluster (22)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	2,115	Cluster employment
E Change 2002-06	-24.08%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.05	Higher concentration
LQ2006-2002	-0.83	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$48,035	Compensation per employment
Region's C as % of U.S.	84.37%	Slightly lower than U.S.
Change in C 2006-2002 (%)	18.33%	Positive Growth
Productivity (PRO)		
PRO 2006	$187,103	Productivity
Change in PRO 2006-2002 (%)	27.01%	Strong positive trend
Region's PRO as % of U.S.	101.58%	Slightly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$290	Total Export
EX as % of Output	73.21%	Exports sizable share of output
EX as % of Region's EX	1.86%	Not a significant player in the region
Imports (IM)		
IM 2006 (Million $)	$151	Total Imports
Industry Mix Effect on Employment Growth	-4%	A relatively average growing cluster
Regional Effect on Employment Growth	-28%	Negative locational advantage
Technology Sectors (%)	6.99%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF MACHINE TOOLS CLUSTER (22): REGION AND BEYOND


Cluster 22 by County
1,000 to 2,200
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Middle Tennessee Marketing Region
Nashville MSA
Huntsville MSA, AL
Nashville
Hendersonville
Lebanon
Gallatin
Brentwood
Franklin
Murfreesboro
Smyrna
La Vergne
Columbia
Shelbyville
Lewisburg
Fayetteville
Manchester
Tullahoma
Winchester
Springfield
Clarksville
Dickson
Waverly
Centerville
Hohenwald
Lawrenceburg
Pulaski
Ashland City
Pleasant View
Cookeville
Sparta
McMinnville
Smithville
Woodbury
Shelbyville
Tracy City
Coalmont
Altamont
Monteagle
Kimball
Huntland
Bridgeport
Jasper
Guthrie
Barren Plain
Adolphus
Westmoreland
Bethpage
Lafayette
Macon
Red Boiling Springs
Clay
Celina
Jackson
Carthage
Smith
Gordonsville
Baxter
Wilson
Alexandria
De Kalb
Trousdale
Sumner
Robertson
Cheatham
Davidson
Williamson
Rutherford
Cannon
Warren
Coffee
Bedford
Moore
Lincoln
Franklin
Marion
Grundy
Irving
College
Welchlar
Dibrell
Summitville
Bradyville
Almaville
Boston
Spring Hill
Maury
Marshall
Giles
Lawrence
Wayne
Hickman
Lewis
Perry
Linden
Lobelville
Coble
Only
Bold Spring
Humphreys
Burns
Charlotte
Belle Meade
Oak Hill
Fairview
Lyles
Fountain Heights
Culleoka
Summertown
Waynesboro
Collinwood
Loretto
Iron City
Cypress Inn
St. Joseph
Lauderdale
Lexington
Minor Hill
Ardmore
Blanche
Belleview
Brighton
Cowan
Whitwell
Van Buren
Grundy
Putnam
Overton
Fentress
Scott
Morgan
Roane
Anderson
Campbell
Union
Claiborne
Hancock
Hawkins
Sullivan
Unicoi
Johnson
Carter
Washington
Greene
Cocke
Sevier
Blount
Knox
Loudon
Monroe
Polk
Bradley
Meigs
Rhea
Hamilton
Marion
Sequatchie
Grundy
Van Buren
Warren
White
Cumberland

TARGET INDUSTRY CLUSTER: MACHINE TOOLS CLUSTER (22)

Cluster Number: 22
Cluster Name: Machine Tools
Cluster Status: MATURE (Highly Concentrated with Decrease)
Technology Content: Small Technology-Intensive

Number of Establishments: 92 (2007 Q1)
Average Wage: $43,488 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 2,263 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 22 (B)	Major Industries in Machine Tools Cluster (22) (C)	Major Industries Purchasing Goods and Services from Cluster 22 (D)
Sawmills	Iron and steel forging	Motor vehicle parts manufacturing
Machine shops	Hand and edge tool manufacturing	Automobile and light truck manufacturing
Wholesale trade	Hardware manufacturing	AC, refrigeration, and forced air heating
Burial casket manufacturing	Spring and wire product manufacturing	Burial casket manufacturing
Truck transportation	Machine shops	Mattress manufacturing
Real estate	Turned product and screw- nut- and bolt	Machine shops
Ball and roller bearing manufacturing	Metal valve manufacturing	
Other state and local government enterprises	Ball and roller bearing manufacturing	
Plastics plumbing fixtures and all other plastics products	Industrial mold manufacturing	
	Special tool- die- jig- and fixture man	
	Cutting tool and machine tool accessory	
	Speed changers and mechanical power tra	
	Burial casket manufacturing	

E MAJOR COMMODITIES IMPORTED BY CLUSTER 22

Commodities Imported	Million $
Iron and steel mills	$27.86
Management of companies and enterprises	$12.21
Wholesale trade	$9.35
Hardware manufacturing	$5.80
Steel wire drawing	$5.63
All other miscellaneous professional and technical	$5.25
Machine shops	$4.76
Copper rolling- drawing- and extruding	$4.41
Ferrous metal foundaries	$4.05
Ball and roller bearing manufacturing	$3.48
Semiconductors and related device manufacturing	$2.99

F MISSING INDUSTRIES FROM CLUSTER 22

- Saw blade & handsaw manf
- Small arms manf
- Industrial pattern manf
- Air purification equip manf
- Industrial & commercial fan & blower manf
- Fluid power cylinder & actuator manf
- Fluid power pump & motor manf
- Military armored vehicles & tank parts manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 22

- General and Operations Managers
- First-Line Supervisors/Managers of Production and Operating
- Assemblers and Fabricators, All Other
- Welders, Cutters, Solderers, and Brazers
- Bindery Workers
- Crushing, Grinding, and Polishing Machine Setters, Operators
- Helpers--Production Workers
- Production Workers, All Other
- Truck Drivers, Heavy and Tractor-Trailer
- Industrial Truck and Tractor Operators

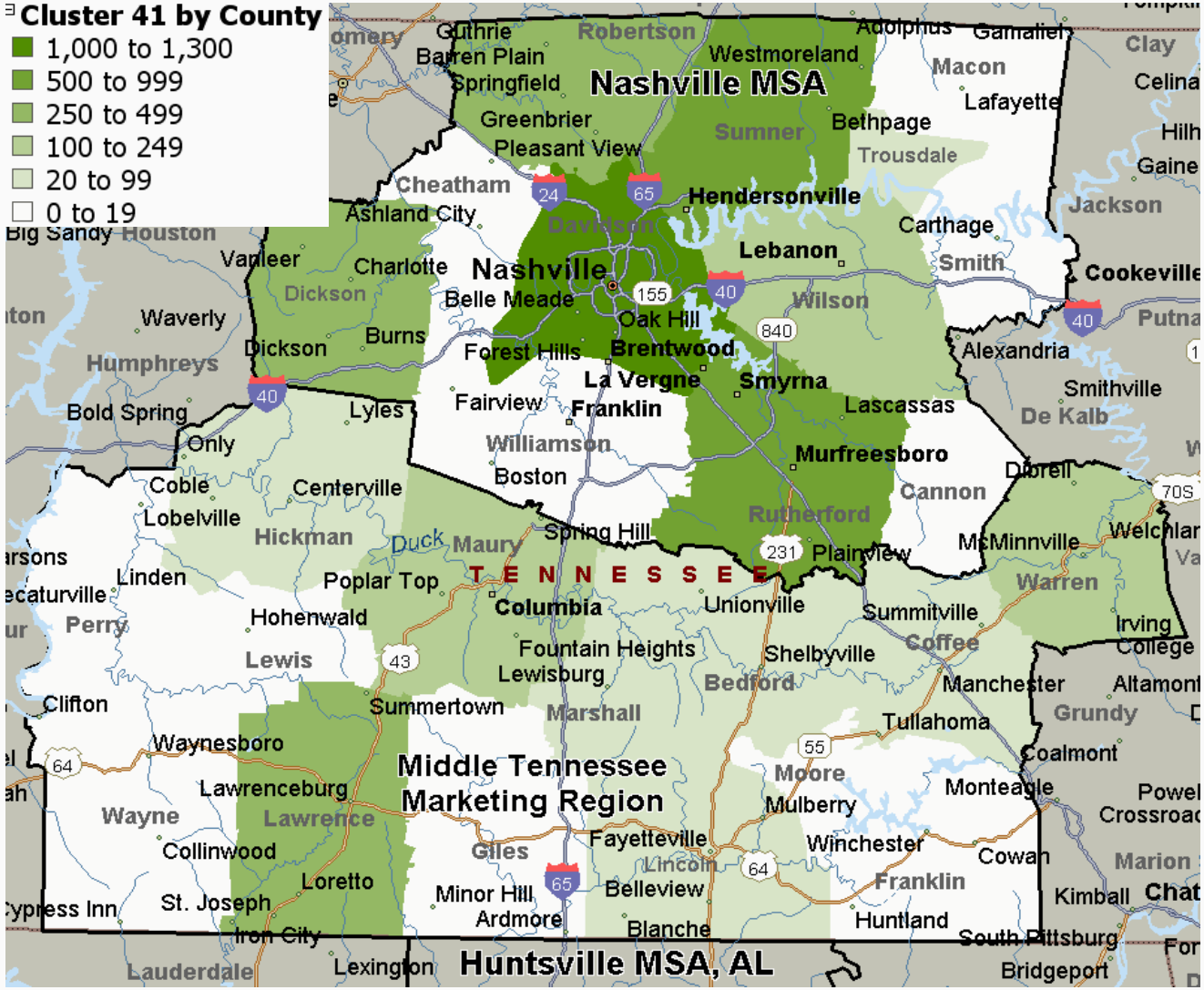
METALWORKING AND FABRICATED METAL PRODUCTS CLUSTER (41): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Metalworking and Fabricated Metal Products Cluster (41)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	991	Cluster employment
E Change 2002-06	-1.33%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	1.36	Higher concentration
LQ2006-2002	-0.12	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$38,281	Compensation per employment
Region's C as % of U.S.	73.05%	Lower than U.S.
Change in C 2006-2002 (%)	-14.52%	Negative Growth
Productivity (PRO)		
PRO 2006	$190,537	Productivity
Change in PRO 2006-2002 (%)	25.56%	Strong positive trend
Region's PRO as % of U.S.	87.08%	Slightly lower than U.S.
Export (EX)		
EX 2006 (Million $)	$188	Total Export
EX as % of Output	99.48%	Exports sizable share of output
EX as % of Region's EX	1.21%	Not a significant player in the region
Imports (IM)		
IM 2006 (Million $)	$103	Total Imports
Industry Mix Effect on Employment Growth	-4%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	-6%	Negative locational advantage
Technology Sectors (%)	21.87%	Contains some technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF METALWORKING AND FABRICATED METAL PRODUCTS CLUSTER (41): REGION AND BEYOND


Cluster 41 by County
1,000 to 1,300
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Nashville MSA
Middle Tennessee Marketing Region
Huntsville MSA, AL
Nashville
Hendersonville
Lebanon
Murfreesboro
Brentwood
Franklin
Columbia
Shelbyville
Manchester
Tullahoma
Fayetteville
Lewisburg
Spring Hill
Smyrna
La Vergne
Clarksville
Robertson
Sumner
Wilson
Cheatham
Dickson
Williamson
Rutherford
Cannon
Coffee
Bedford
Marshall
Giles
Lincoln
Moore
Warren
Grundy
Franklin
Lewis
Lawrence
Wayne
Hickman
Maury
Perry
Humphreys
Houston
Stewart
Montgomery
Clay
Macon
Smith
Jackson
Putnam
De Kalb
Cookeville
Smithville
McMinnville
Alexandria
Lascassas
Murfreesboro
Unionville
Summitville
Irving College
Altamont
Coalmont
Monteagle
Winchester
Cowan
Kimball
Huntland
South Pittsburg
Bridgeport
Lauderdale
Lexington
Iron City
Minor Hill
Ardmore
Belleview
Blanche
Loretto
St. Joseph
Collinwood
Lawrenceburg
Waynesboro
Clifton
Summertown
Mount Pleasant
Linden
Centerville
Coble
Lobelville
Only
Bold Springs
Waverly
Dickson
Burns
Ashland City
Cheatham
Pleasant View
Greenbrier
Springfield
Barren Plain
Guthrie
Adolphus
Gamaliel
Celina
Hilham
Gainesboro
Carthage
Trousdale
Bethpage
Lafayette
Westmoreland
Robertson
Dickson
Belle Meade
Oak Hill
Forest Hills
Fairview
Franklin
Williamson
Boston
Spring Hill
Duck
Maury
Rutherford
Cannon
Murfreesboro
Dibrell
Warren
Coffee
Bedford
Marshall
Giles
Lincoln
Moore
Franklin
Lewis
Lawrence
Wayne
Hickman
Perry
Humphreys
Houston
Stewart
Montgomery
Clay
Macon
Smith
Jackson
Putnam
De Kalb
Cookeville
Smithville
McMinnville
Alexandria
Lascassas

TARGET INDUSTRY CLUSTER: METALWORKING AND FABRICATED METAL PRODUCTS CLUSTER (41)

Cluster Number: 41
Cluster Name: Metalworking & Fabricated Metal Products
Cluster Status: MATURE (Highly Concentrated with Decrease)
Technology Content: Somewhat Technology-Intensive

Number of Establishments: 44 (2007 Q1)
Average Wage: $32,060 (2007 Q1) **A**
Slightly less than region's average wage of $32,192 for 2007 Q1
Total Employment: 1,067 (2007 Q1)

Major Industries Selling Goods and Services to Cluster 41 **B**	Major Industries in Metalworking & Fabricated Metal Products Cluster (41) **C**	Major Industries Purchasing Goods and Services from Cluster 41 **D**
Wholesale trade	Steel wire drawing	Automobile and light truck manufacturing
Truck transportation	All other forging and stamping	Motor vehicle parts manufacturing
Motor vehicle parts manufacturing	Fabricated structural metal manufacturi	AC, refrigeration, and forced air heating
Real estate	Plate work manufacturing	Motor and generator manufacturing
Monetary authorities and depository credit intermediation	Metal window and door manufacturing	Metal tank, heavy gauge, manufacturing
Special tool, die, jig, and fixture manufacturing	Sheet metal work manufacturing	Aluminum foundries
Power generation and supply	Ornamental and architectural metal work	Soft drink and ice manufacturing
Maintenance and repair of nonresidential buildings	Metal tank- heavy gauge- manufacturing	
	Fabricated pipe and pipe fitting manufa	
	Miscellaneous fabricated metal product	

E MAJOR COMMODITIES IMPORTED BY CLUSTER 41

Commodities Imported	Million $
Iron and steel mills	$31.21
Wholesale trade	$6.65
Fabricated structural metal manufacturing	$6.50
Aluminum sheet- plate- and foil manufacturing	$4.01
Motor vehicle parts manufacturing	$3.75
Sheet metal work manufacturing	$3.59
Management of companies and enterprises	$3.34
Miscellaneous fabricated metal product manufacturi	$3.03
Copper rolling- drawing- and extruding	$2.96
Primary aluminum production	$2.81
All other miscellaneous professional and technical	$2.47

F MISSING INDUSTRIES FROM CLUSTER 41

- Custom roll forming
- Prefabricated metal buildings & components
- Power boiler & heat exchanger manf
- Industrial & commercial fan & blower manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 41

- Assemblers and Fabricators, All Other
- First-Line Supervisors/Managers of Production and Operating
- Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders
- Helpers--Production Workers
- Inspectors, Testers, Sorters, Samplers, and Weighers
- Packers and Packagers, Hand
- Production Workers, All Other
- Sewing Machine Operators
- Shipping, Receiving, and Traffic Clerks
- Shoe and Leather Workers and Repairers

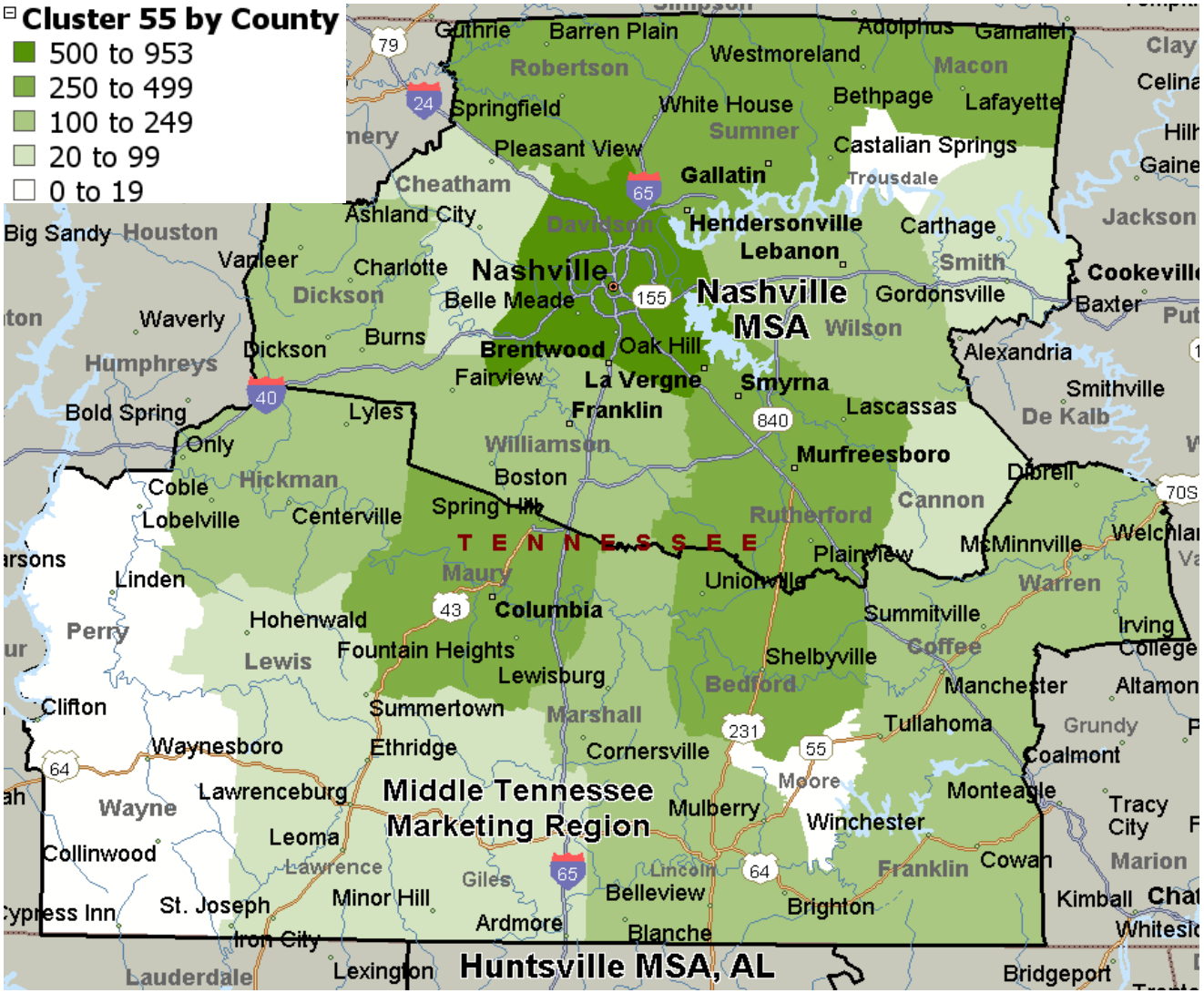
PLASTICS PRODUCTS CLUSTER (55): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Plastics Products Cluster (55)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	1,594	Cluster employment
E Change 2002-06	-32.64%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.3	Higher concentration
LQ2006-2002	-1.12	Decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$45,390	Compensation per employment
Region's C as % of U.S.	88.40%	Lower than U.S.
Change in C 2006-2002 (%)	8.75%	Positive Growth
Productivity (PRO)		
PRO 2006	$292,389	Productivity
Change in PRO 2006-2002 (%)	43.21%	Strong positive trend
Region's PRO as % of U.S.	99.33%	U.S. Average
Export (EX)		
EX 2006 (Million $)	$281	Total Export
EX as % of Output	60.25%	Exports sizable share of output
EX as % of Region's EX	1.81%	Important player in the region
Imports (IM)		
IM 2006 (Million $)	$234	Total Imports
Industry Mix Effect on Employment Growth	-11%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	-30%	Negative locational advantage
Technology Sectors (%)	5.32%	Contains some technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF PLASTICS PRODUCTS CLUSTER (55): REGION AND BEYOND



TARGET INDUSTRY CLUSTER: PLASTICS PRODUCTS CLUSTER (55)

Cluster Number: 55
Cluster Name: Plastics Products
Cluster Status: MATURE (Highly Concentrated with Decrease)
Technology Content: Somewhat Technology-Intensive

Number of Establishments: 36 (2007 Q1)
Average Wage: $36,342 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 1,764 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 55	Major Industries in Plastics Products Cluster (55)	Major Industries Purchasing Goods and Services from Cluster 55
Truck transportation	Pesticide and other agricultural chemic	Automobile and light truck manufacturing
Plastics packaging materials, film and sheet	Adhesive manufacturing	Motor vehicle parts manufacturing
Wholesale trade	Custom compounding of purchased resins	Toilet preparation manufacturing
Pesticide and other agricultural chemical manufacturing	Plastics pipe- fittings- and profile sh	Food services and drinking places
Plastic material and resin manufacturing	Resilient floor covering manufacturing	AC, refrigeration, and forced air heating
Plastics plumbing fixtures and all other plastics products	Plastics plumbing fixtures and all othe	Mattress manufacturing
Other basic organic chemical manufacturing	Foam product manufacturing	Pesticide and other agricultural chemical manufacturing
Custom compounding of purchased resins		

B **C** **D**

E MAJOR COMMODITIES IMPORTED BY CLUSTER 55

Commodities Imported	Million $
Plastics material and resin manufacturing	$75.00
Other basic organic chemical manufacturing	$29.32
Wholesale trade	$14.90
Petroleum refineries	$10.52
Management of companies and enterprises	$9.72
Petrochemical manufacturing	$6.01
All other miscellaneous professional and technical	$5.41
Pesticide and other agricultural chemical manufact	$4.71
Plastics pipe- fittings- and profile shapes	$4.31
Paperboard container manufacturing	$4.28
Semiconductors and related device manufacturing	$3.54

F MISSING INDUSTRIES FROM CLUSTER 55

- Synthetic rubber manf
- Cellulosic organic fiber manf
- Noncellulosic organic fiber manf
- Photographic film & chemical manf
- Plastics bottle manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 55

- Bindery Workers
- First-Line Supervisors/Managers of Office and Administrative
- General and Operations Managers
- Life, Physical, and Social Science Technicians, All Other
- Machine Feeders and Offbearers
- Office Clerks, General
- Photographic Processing Machine Operators
- Printing Machine Operators
- Sales Representatives, Wholesale and Manufacturing, Technica
- Writers and Authors

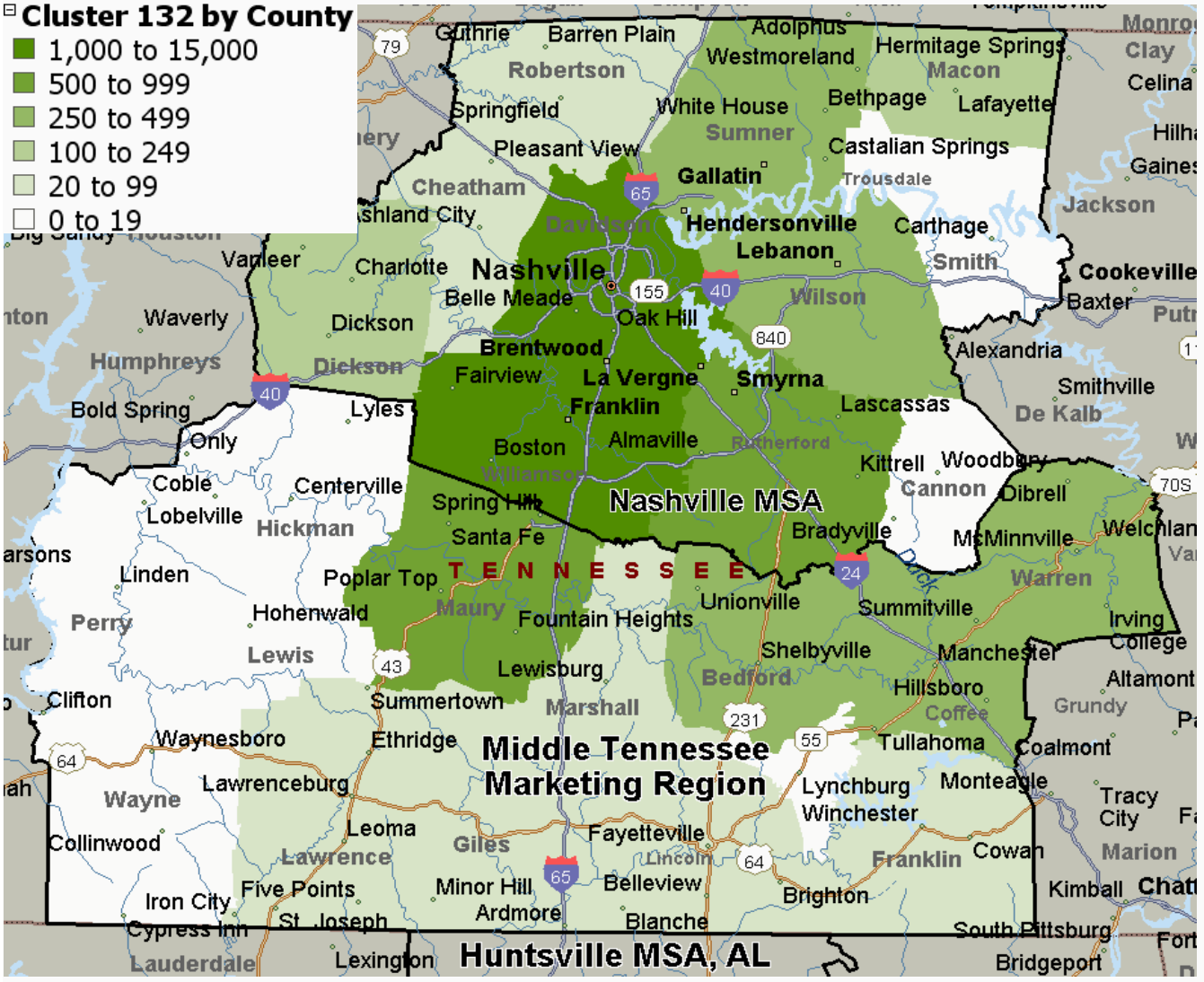
INFORMATION SERVICES CLUSTER (132): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Information Services Cluster (132)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	2,533	Cluster employment
E Change 2002-06	2.25%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	0.41	Low concentration
LQ2006-2002	0.05	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$46,336	Compensation per employment
Region's C as % of U.S.	80.05%	Lower than U.S.
Change in C 2006-2002 (%)	9.09%	Positive Growth
Productivity (PRO)		
PRO 2006	$168,069	Productivity
Change in PRO 2006-2002 (%)	41.93%	Strong positive trend
Region's PRO as % of U.S.	92.44%	Slightly lower than U.S.
Export (EX)		
EX 2006 (Million $)	$98	Total Export
EX as % of Output	22.92%	Exports small share of output
EX as % of Region's EX	0.63%	Not a player in the region
Imports (IM)		
IM 2006 (Million $)	$117	Total Imports
Industry Mix Effect on Employment Growth	-20%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	14%	Positive locational advantage
Technology Sectors (%)	53.49%	Contains technology sectors & Enabling

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF INFORMATION SERVICES CLUSTER (132): REGION AND BEYOND


Cluster 132 by County
1,000 to 15,000
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Nashville MSA
Middle Tennessee Marketing Region
Huntsville MSA, AL
TENNESSEE
Nashville
Hendersonville
Lebanon
Gallatin
Brentwood
Franklin
Smyrna
La Vergne
Murfreesboro
Clarksville
Springfield
Robertson
Sumner
Wilson
Cheatham
Dickson
Williamson
Rutherford
Maury
Marshall
Bedford
Giles
Lawrence
Lewis
Perry
Wayne
Hickman
Cannon
Warren
Coffee
Franklin
Lincoln
Moore
Jackson
Smith
Macon
Trousdale
De Kalb
Clay
Cookeville
Monteagle
Tullahoma
Manchester
Shelbyville
Lewisburg
Fayetteville
Columbia
Lawrenceburg
Waynesboro
Hohenwald
Centerville
Lobelville
Waverly
Dickson
Charlotte
Ashland City
Pleasant View
White House
Springfield
Adolphus
Westmoreland
Hermitage Springs
Bethpage
Lafayette
Castalian Springs
Carthage
Alexandria
Smithville
Lascassas
Woodbury
Kittrell
Dibrell
McMinnville
Bradyville
Unionville
Summitville
Fountain Heights
Santa Fe
Spring Hill
Boston
Almaville
Belle Meade
Oak Hill
Fairview
Franklin
Linden
Poplar Top
Lewisburg
Summertown
Ethridge
Leoma
Collinwood
Iron City
Five Points
St. Joseph
Cypress Inn
Lauderdale
Lexington
Minor Hill
Ardmore
Belleview
Blanche
Brighton
Lynchburg
Winchester
Cowan
Tracy City
Monteagle
Coalmont
Grundy
Altamont
Irving College
Kimball
South Pittsburg
Bridgeport
Fort Payne
Guthrie
Barren Plain
Adolphus
Westmoreland
Hermitage Springs
Bethpage
Lafayette
Castalian Springs
Trousdale
Carthage
Smith
Cookeville
Baxter
Alexandria
Smithville
De Kalb
Lascassas
Woodbury
Kittrell
Dibrell
McMinnville
Bradyville
Unionville
Summitville
Fountain Heights
Shelbyville
Manchester
Hillsboro
Coffee
Tullahoma
Coalmont
Grundy
Altamont
Irving College
Tracy City
Monteagle
Lynchburg
Winchester
Cowan
Franklin
Marion
Kimball
South Pittsburg
Bridgeport
Fort Payne
Belleview
Brighton
Blanche
Minor Hill
Ardmore
Five Points
Iron City
St. Joseph
Cypress Inn
Lexington
Lauderdale
Collinwood
Leoma
Lawrenceburg
Waynesboro
Ethridge
Summertown
Lewisburg
Fayetteville
Columbia

TARGET INDUSTRY CLUSTER: INFORMATION SERVICES CLUSTER (132)

Cluster Number: 132
Cluster Name: Information Services
Cluster Status: EMERGING (Low Concentration with Increase)
Technology Content: Semi-Technology Incentive

Number of Establishments: 133 (2007 Q1)
Average Wage: $45,655 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 2,680 (2007 Q1)

A

B — Major Industries Selling Goods and Services to Cluster 132

- Telecommunications
- Architectural and engineering services
- Accounting and bookkeeping services
- Real estate
- Employment services
- Household goods repair and maintenance
- Monetary authorities and depository credit intermediation

C — Major Industries in Information Services Cluster (132)

- Telecommunications
- Information services
- Data processing services
- Custom computer programming services
- Computer systems design services
- Other computer related services- includ
- Photographic services
- Investigation and security services
- Electronic equipment repair and mainten

D — Major Industries Purchasing Goods and Services from Cluster 132

- Telecommunications
- Motor vehicle parts manufacturing
- Scientific research and development services
- Wholesale trade
- AC, refrigeration, and forced air heating
- Waste management and remediation services
- Scientific research and development services
- Truck transportation
- Real estate
- Data processing services
- Automobile and light truck manufacturing

E — MAJOR COMMODITIES IMPORTED BY CLUSTER 132

Commodities Imported	Million $
Telecommunications	$29.48
Architectural and engineering services	$6.74
Semiconductors and related device manufacturing	$5.24
All other miscellaneous professional and technical	$4.08
Noncomparable imports	$3.79
Accounting and bookkeeping services	$3.49
Advertising and related services	$3.28
Other computer peripheral equipment manufacturing	$2.99
Real estate	$2.98
Wholesale trade	$2.53
Data processing services	$2.38

F — MISSING INDUSTRIES FROM CLUSTER 132

- Software publishers

G — MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 132

- Advertising Sales Agents
- Announcers
- Assemblers and Fabricators, All Other
- Broadcast Technicians
- General and Operations Managers
- Office Clerks, General
- Packaging and Filling Machine Operators and Tenders
- Producers and Directors
- Secretaries, Except Legal, Medical, and Executive
- Shipping, Receiving, and Traffic Clerks

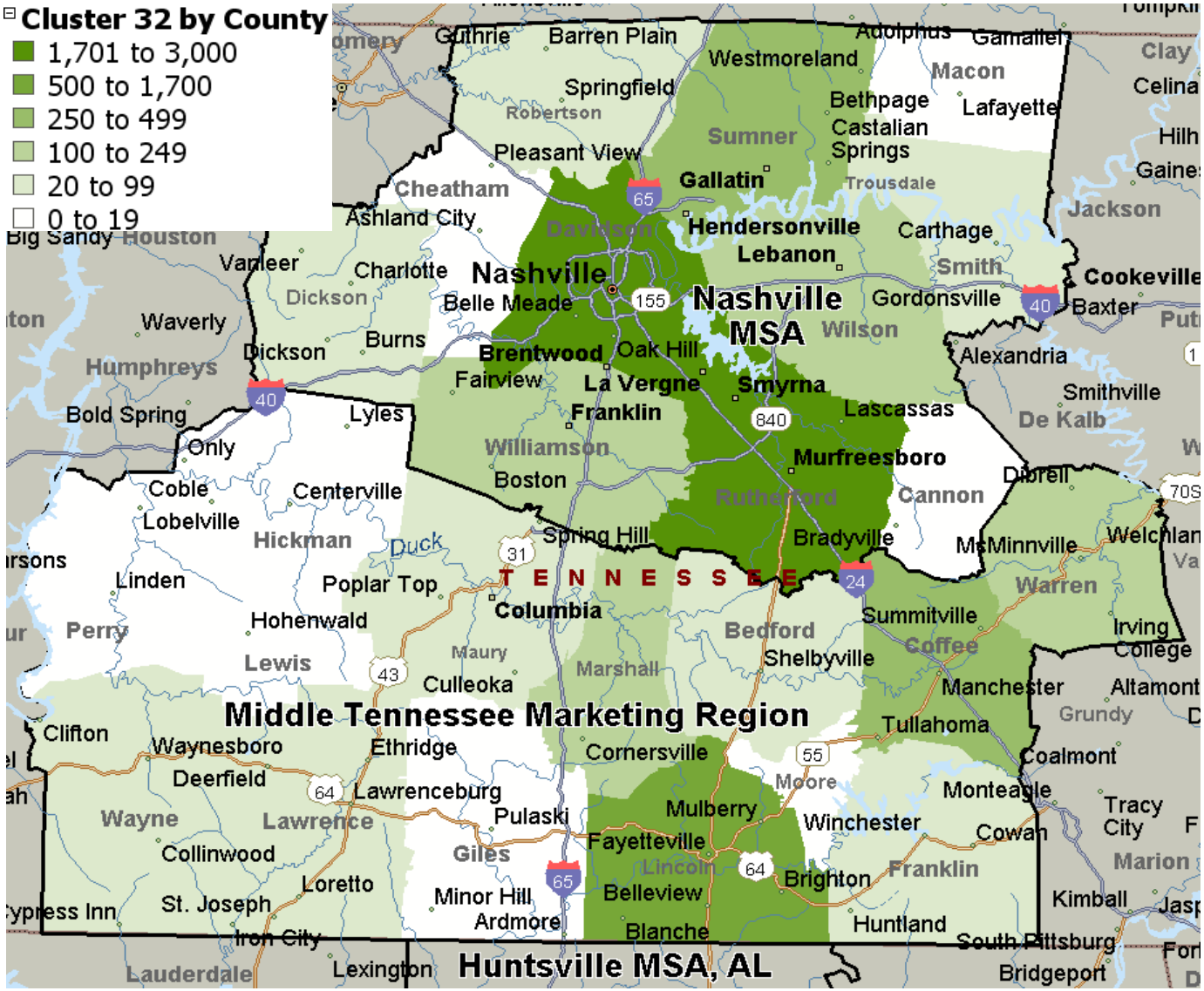
NONDURABLE INDUSTRY MACHINERY CLUSTER (32): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Nondurable Industry Machinery Cluster (32)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	4,331	Cluster employment
E Change 2002-06	-35.88%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	4.96	Higher concentration
LQ2006-2002	-1.66	Some decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$47,688	Compensation per employment
Region's C as % of U.S.	91.97%	Slightly lower than U.S.
Change in C 2006-2002 (%)	3.40%	Positive Growth
Productivity (PRO)		
PRO 2006	$284,306	Productivity
Change in PRO 2006-2002 (%)	46.21%	Strong positive trend
Region's PRO as % of U.S.	129.00%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$1,097	Total Export
EX as % of Output	89.10%	Exports sizable share of output
EX as % of Region's EX	7.06%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$751	Total Imports
Industry Mix Effect on Employment Growth	-25%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	-20%	Negative locational advantage
Technology Sectors (%)	3.88%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF NONDURABLE INDUSTRY MACH. CLUSTER (32): REGION AND BEYOND


Cluster 32 by County
1,701 to 3,000
500 to 1,700
250 to 499
100 to 249
20 to 99
0 to 19
Middle Tennessee Marketing Region
Huntsville MSA, AL
Nashville MSA
Nashville
Hendersonville
Lebanon
Gallatin
Murfreesboro
Franklin
Brentwood
Columbia
Shelbyville
Manchester
Tullahoma
Cookeville
Springfield
Clarksville
Dickson
Waverly
Lawrenceburg
Fayetteville
Pulaski
Winchester
Decherd
Sewanee
Monteagle
Smithville
McMinnville
Lewisburg
Centerville
Hohenwald
Linden
Lobelville
Coble
Only
Bold Spring
Humphreys
Perry
Lewis
Wayne
Lawrence
Giles
Marshall
Maury
Williamson
Rutherford
Wilson
Sumner
Davidson
Robertson
Cheatham
Dickson
Houston
Humphreys
Hickman
Duck
Lyles
Burns
Charlotte
Belle Meade
Oak Hill
Fairview
La Vergne
Smyrna
Lascassas
Boston
Spring Hill
Bradyville
Cannon
Warren
Coffee
Bedford
Marshall
Lincoln
Moore
Franklin
Williamson
Jackson
Macon
Smith
Clay
Wilson
Alexandria
De Kalb
Cannon
Warren
Coffee
Grundy
Marion
Tracy City
Cowan
Huntland
Belleview
Blanche
Minor Hill
Ardmore
Loretto
St. Joseph
Collinwood
Deerfield
Waynesboro
Clifton
Ethridge
Cornersville
Mulberry
Lexington
Lauderdale
Iron City
Cypress Inn
Linden
Poplar Top
Culleoka
Westmoreland
Barren Plain
Guthrie
Pleasant View
Ashland City
Carthage
Gordonsville
Baxter
Alexandria
Smithville
Murfreesboro
Summitville
Irving College
Altamont
Coalmont
Tullahoma
Manchester
Shelbyville
Bradyville
Spring Hill
Columbia
Franklin
Brentwood
Oak Hill
Fairview
La Vergne
Smyrna
Lascassas
Nashville
Belle Meade
Springfield
Robertson
Sumner
Bethpage
Castalian Springs
Trousdale
Gallatin
Hendersonville
Lebanon
Carthage
Gordonsville
Smith
Cookeville
Jackson
Macon
Lafayette
Clay
Celina
Adolphus
Gamaliel
Westmoreland
Barren Plain
Guthrie
Pleasant View
Ashland City
Cheatham
Davidson
Dickson
Waverly
Houston
Humphreys
Bold Spring
Only
Coble
Lobelville

TARGET INDUSTRY CLUSTER: NONDURABLE INDUSTRY MACHINERY CLUSTER (32)

Cluster Number: 32
Cluster Name: Nondurable Industry Machinery
Cluster Status: MATURE (Highly Concentrated with Decrease)
Technology Content: Small Technology-Intensive

Number of Establishments: 61 (2007 Q1)
Average Wage: $35,018 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 2,376 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 32 (B)	Major Industries in Nondurable Industry Machinery Cluster (32) (C)	Major Industries Purchasing Goods and Services from Cluster 32 (D)
Wholesale trade	Sawmill and woodworking machinery	Waste management and remediation services
Motor and generator manufacturing	Plastics and rubber industry machinery	AC, refrigeration, and forced air heating
Truck transportation	Printing machinery and equipment manufa	Automobile and light truck manufacturing
Telecommunications	All other industrial machinery manufact	Motor vehicle parts manufacturing
Real estate	Other commercial and service industry m	Scientific research and development services
Monetary authorities and depository credit intermed.	Heating equipment- except warm air furn	Motor and generator manufacturing
Plastics plumbing fixtures and all other plastics	AC- refrigeration- and forced air heati	Commercial printing
Machine shops	Metal forming machine tool manufacturin	Sawmills
Maintenance and repair of nonresidential buildings	Air and gas compressor manufacturing	Wholesale trade
	Power-driven handtool manufacturing	
	Motor and generator manufacturing	
	Relay and industrial control manufactur	
	Commercial machinery repair and mainten	

E MAJOR COMMODITIES IMPORTED BY CLUSTER 32

Commodities Imported	Million $
AC- refrigeration- and forced air heating	$104.50
Iron and steel mills	$63.06
Wholesale trade	$61.48
Copper rolling- drawing- and extruding	$60.92
Motor and generator manufacturing	$55.07
Management of companies and enterprises	$31.83
Automatic environmental control manufacturing	$21.25
Aluminum sheet- plate- and foil manufacturing	$15.60
All other miscellaneous professional and technical	$14.84
Semiconductors and related device manufacturing	$13.84
Ferrous metal foundaries	$13.62

F MISSING INDUSTRIES FROM CLUSTER 32

Food product machinery manf
Pump & pumping equip manf
Other engine equip manf
Scales, balances, & misc general purpose m.
Measuring & dispensing pump manf
Conveyor & conveying equip manf
Rolling mill & other metalworking machinery
Paper industry machinery manf
Fluid power pump & motor manf
Semiconductor machinery manf
Welding & soldering equip manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 32

General and Operations Managers
Shipping, Receiving, and Traffic Clerks
Maintenance and Repair Workers, General
First-Line Supervisors/Managers of Production and Operating
Assemblers and Fabricators, All Other
Forging Machine Setters, Operators, and Tenders, Metal and P
Cutting, Punching, and Press Machine Setters, Operators, and
Drilling and Boring Machine Tool Setters, Operators, and Ten
Machinists
Helpers--Production Workers
Packers and Packagers, Hand

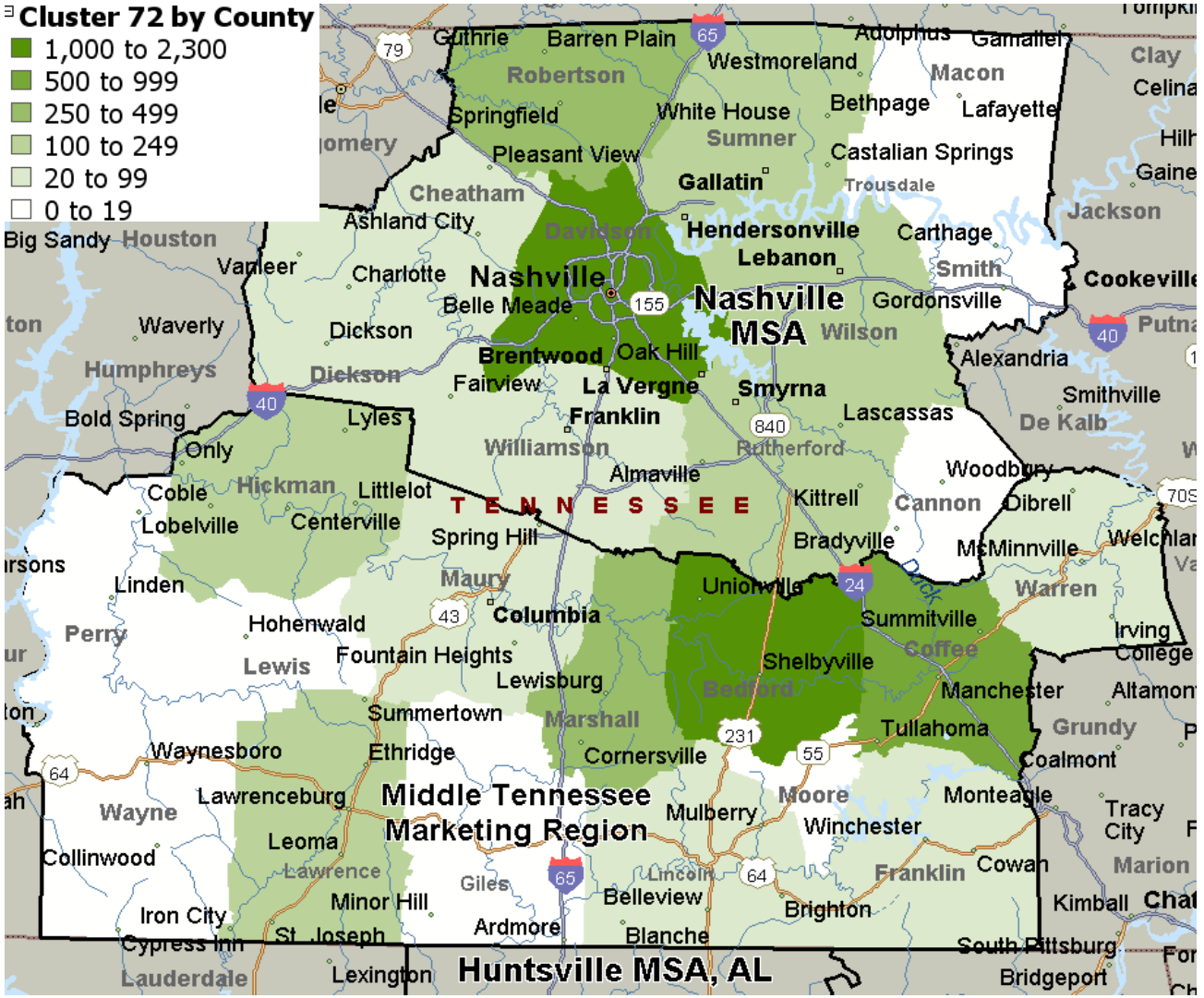
OPTICAL INSTRUMENT AND EQUIPMENTS CLUSTER (72): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Optical Instrument and Equipments Cluster (72)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	2,511	Cluster employment
E Change 2002-06	3.27%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	7.98	Higher concentration
LQ2006-2002	0.28	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$42,775	Compensation per employment
Region's C as % of U.S.	61.47%	Less than U.S.
Change in C 2006-2002 (%)	31.88%	Strong Positive Growth
Productivity (PRO)		
PRO 2006	$180,629	Productivity
Change in PRO 2006-2002 (%)	68.44%	Strong positive trend
Region's PRO as % of U.S.	63.66%	Less than U.S.
Export (EX)		
EX 2006 (Million $)	$396	Total Export
EX as % of Output	87.21%	Exports sizable share of output
EX as % of Region's EX	2.54%	Important player in the region
Imports (IM)		
IM 2006 (Million $)	$146	Total Imports
Industry Mix Effect on Employment Growth	-11%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	6%	Positive locational advantage
Technology Sectors (%)	6.17%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF OPTICAL EQUIPMENT AND INSTRUMENTS CLUSTER (72): REGION AND BEYOND


Cluster 72 by County
1,000 to 2,300
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Middle Tennessee Marketing Region
Huntsville MSA, AL
Nashville MSA
Nashville
Hendersonville
Lebanon
Gallatin
Franklin
Brentwood
Columbia
Murfreesboro
Smyrna
La Vergne
Spring Hill
Shelbyville
Tullahoma
Manchester
Summertown
Lewisburg
Fayetteville
Winchester
Cowan
Sumner
Wilson
Williamson
Rutherford
Davidson
Robertson
Cheatham
Dickson
Hickman
Lewis
Perry
Wayne
Lawrence
Giles
Lincoln
Marshall
Bedford
Coffee
Moore
Franklin
Tullahoma
Springfield
White House
Pleasant View
Ashland City
Charlotte
Belle Meade
Oak Hill
Fairview
Bold Spring
Only
Coble
Lobelville
Centerville
Linden
Hohenwald
Fountain Heights
Waynesboro
Ethridge
Lawrenceburg
Leoma
Collinwood
Iron City
Minor Hill
Ardmore
Blanche
Belleview
Mulberry
Cornersville
Almaville
Littlelot
Lyles
Waverly
Humphreys
Big Sandy
Houston
Vanleer
Guthrie
Barren Plain
Westmoreland
Adolphus
Gamaliel
Macon
Bethpage
Lafayette
Castalian Springs
Trousdale
Carthage
Smith
Gordonsville
Alexandria
Smithville
De Kalb
Lascassas
Woodbury
Cannon
Dibrell
Kittrell
Bradyville
McMinnville
Warren
Summitville
Irving College
Altamont
Grundy
Coalmont
Tracy City
Monteagle
Marion
Kimball
Chat
Brighton
Belleview
Lexington
St. Joseph
Cypress Inn
Lauderdale
South Pittsburg
Bridgeport
Jackson
Clay
Gaine
Cookeville
Putna
Smithville
Dickson
Williamson
Rutherford
Wilson
Sumner
Trousdale
Smith
Jackson
Macon
Clay
Warren
Coffee
Bedford
Moore
Franklin
Lincoln
Giles
Lawrence
Marshall
Maury
Hickman
Lewis
Perry
Wayne
Davidson
Robertson
Cheatham
Dickson
Houston
Humphreys
Stewart
Montgomery
Benton
Decatur
Henderson
Chester
Madison
Crockett
Gibson
Carroll
Henry
Weakley
Obion
Dyer
Lake
Fulton
Hardeman
McNairy
Hardin
Tipton
Lauderdale
Shelby
Haywood
Chester
Henderson
Decatur
Benton
Stewart
Montgomery
Robertson
Sumner
Wilson
Trousdale
Smith
Jackson
Clay
Macon
Cookeville
Putnam
Overton
Fentress
Pickett
Scott
Morgan
Anderson
Campbell
Claiborne
Grainger
Hamblen
Jefferson
Cocke
Sevier
Blount
Knox
Loudon
Roane
Meigs
Rhea
Bledsoe
Sequatchie
Marion
Hamilton
Bradley
Polk
Monroe
Carter
Unicoi
Washington
Greene
Hawkins
Sullivan
Johnson
Hancock
Union
Claiborne
Campbell
Scott
Morgan
Anderson
Knox
Loudon
Roane
Meigs
Rhea
Bledsoe
Sequatchie
Marion
Hamilton
Bradley
Polk
Monroe
Carter
Unicoi
Washington
Greene
Hawkins
Sullivan
Johnson
Hancock
Union
Grainger
Hamblen
Jefferson
Cocke
Sevier
Blount
Pickett
Fentress
Overton
Putnam
White
Van Buren
Warren
Cannon
Coffee
Franklin
Lincoln
Moore
Bedford
Marshall
Maury
Giles
Lawrence
Wayne
Hickman
Lewis
Perry
Humphreys

TARGET INDUSTRY CLUSTER: OPTICAL EQUIPMENT AND INSTRUMENTS CLUSTER (72)

Cluster Number: 72
Cluster Name: Optical Equipment and Instruments
Cluster Status: STAR (Highly Concentrated with Increase)
Technology Content: Small Technology-Intensive

Number of Establishments: 49 (2007 Q1)
Average Wage: $36,590 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 2,916 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 72 (B)	Major Industries in Optical Equipment and Instruments Cluster (72) (C)	Major Industries Purchasing Goods and Services from Cluster 72 (D)
Wholesale trade	Surgical and medical instrument manufac	Office supplies, except paper, manufacturing
Truck transportation	Surgical appliance and supplies manufac	Surgical appliance and supplies manufacturing
Plastics packaging materials, film and sheet	Office supplies- except paper- manufact	Toilet preparation manufacturing
Office supplies, except paper, manufacturing	Musical instrument manufacturing	Other ambulatory health care services
Sawmills		Surgical and medical instrument manufacturing
Plastics plumbing fixtures and all other plastics products		Veterinary services
Other state and local government enterprises		
Real estate		
Monetary authorities and depository credit intermediation		
Wood container and pallet manufacturing		

E MAJOR COMMODITIES IMPORTED BY CLUSTER 72

Commodities Imported	Million $
Wholesale trade	$19.06
Paperboard container manufacturing	$11.92
Management of companies and enterprises	$10.14
Office supplies- except paper- manufacturing	$9.25
Other basic organic chemical manufacturing	$7.81
Synthetic dye and pigment manufacturing	$6.26
All other miscellaneous professional and technical	$6.08
Plastics pipe- fittings- and profile shapes	$4.74
Paper and paperboard mills	$4.67
Semiconductors and related device manufacturing	$3.61
Ground or treated minerals and earths manufacturing	$3.35

F MISSING INDUSTRIES FROM CLUSTER 72

- Tradebinding & related work
- Photographic film & chemical manf
- Plastics bottle manf
- Cutlery & flatware, except precious, manf
- Software reproducing
- Audio & video media reproduction
- Magnetic & optical recording media manf
- Ophthalmic goods manf
- Doll, toy, & game manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 72

- Assemblers and Fabricators, All Other
- Electrical and Electronic Equipment Assemblers
- Electromechanical Equipment Assemblers
- First-Line Supervisors/Managers of Production and Operating
- Helpers--Production Workers
- Inspectors, Testers, Sorters, Samplers, and Weighers
- Machinists
- Maintenance Workers, Machinery
- Multiple Machine Tool Setters, Operators, and Tenders, Metal
- Packaging and Filling Machine Operators and Tenders

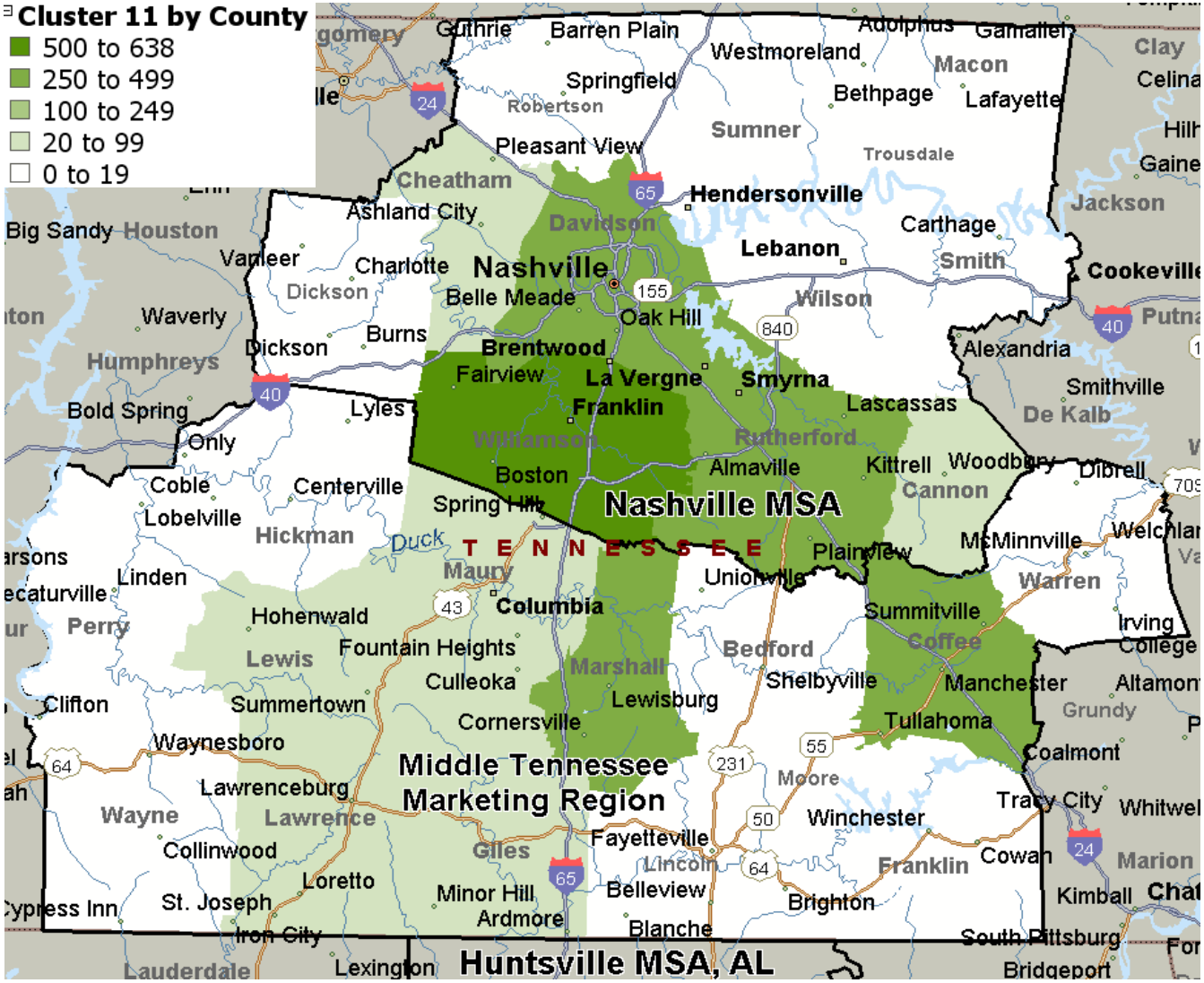
COMPUTER AND ELECTRONIC EQUIPMENT CLUSTER (11): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Computer and Electronic Equipment (11)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	800	Cluster employment
E Change 2002-06	9.47%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	1.48	Higher concentration
LQ2006-2002	0.15	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$45,456	Compensation per employment
Region's C as % of U.S.	60.07%	Significantly less than U.S.
Change in C 2006-2002 (%)	2.19%	Positive Growth
Productivity (PRO)		
PRO 2006	$207,664	Productivity
Change in PRO 2006-2002 (%)	-9.49%	Negative trend
Region's PRO as % of U.S.	69.05%	Less than U.S.
Export (EX)		
EX 2006 (Million $)	$109	Total Export
EX as % of Output	65.54%	Exports sizable share of output
EX as % of Region's EX	0.70%	Not a significant player in the region
Imports (IM)		
IM 2006 (Million $)	$95	Total Imports
Industry Mix Effect on Employment Growth	-12%	Not a relatively fast growing cluster
Regional Effect on Employment Growth	13%	Positive Locational Advantage
Technology Sectors (%)	97.69%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF COMPUTER AND ELECTRONIC EQUIPMENT CLUSTER (11): REGION AND BEYOND



TARGET INDUSTRY CLUSTER: COMPUTER AND ELECTRONIC EQUIPMENT CLUSTER (11)

Cluster Number: 11
Cluster Name: Computer and Electronic Equipment
Cluster Status: STAR (Highly Concentrated with Concentration Increasing)
Technology Content: Technology-Intensive

Number of Establishments: 15 (2007 Q1)
Average Wage: $33,863 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1 **A**
Total Employment: 1,096 (2007 Q1)

Major Industries Selling Goods and Services to Cluster 11	Major Industries in Computer and Electronic Equipment Cluster (11)	Major Industries Purchasing Goods and Services from Cluster 11
All other electronic component manufacturing	Broadcast and wireless communications	Automobile and light truck manufacturing
Wholesale trade	All other electronic component manufacturing	Motor vehicle parts manufacturing
All other electronic component manufacturing	Industrial process variable instruments	All other electronic component manufacturing
Scientific research and development services	Irradiation apparatus manufacturing	AC, refrigeration, and forced air heating
Plastics plumbing fixtures and all other plastics products	Watch- clock- and other measuring	Waste management and remediation services
	Miscellaneous electrical equipment manufacturing	Industrial process variable instruments

B **C** **D**

E MAJOR COMMODITIES IMPORTED BY CLUSTER 11

Commodities Imported	Million $
Semiconductors and related device manufacturing	$27.23
Wholesale trade	$7.91
All other electronic component manufacturing	$6.81
Management of companies and enterprises	$6.17
Broadcast and wireless communications equipment	$3.87
Business support services	$2.85
All other miscellaneous professional and technical	$2.41
Iron and steel mills	$2.15
Primary nonferrous metal- except copper and alumin	$1.61
Architectural and engineering services	$1.61
Electronic computer manufacturing	$1.55
Copper rolling- drawing- and extruding	$1.11
Plastics material and resin manufacturing	$1.03
Legal services	$0.96
All other forging and stamping	$0.94
Sheet metal work manufacturing	$0.87

F MISSING INDUSTRIES FROM CLUSTER 11

Office machinery manf
Electronic computer manf
Computer storage device manf
Computer terminal manf
Other computer peripheral equip manf
Telephone apparatus manf
Other communications equip manf
Electron tube manf
Semiconductors & related device manf
Electromedical apparatus manf
Search, detection, & navigation instruments
Electricity & signal testing instruments
Analytical laboratory instrument manf

G MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 11

General and Operations Managers
Mechanical Engineers
Mechanical Drafters
Computer, Automated Teller, and Office Machine Repairers
First-Line Supervisors/Managers of Production and Operating
Engine and Other Machine Assemblers
Assemblers and Fabricators, All Other
Machinists
Welders, Cutters, Solderers, and Brazers
Welding, Soldering, and Brazing Machine Setters, Operators

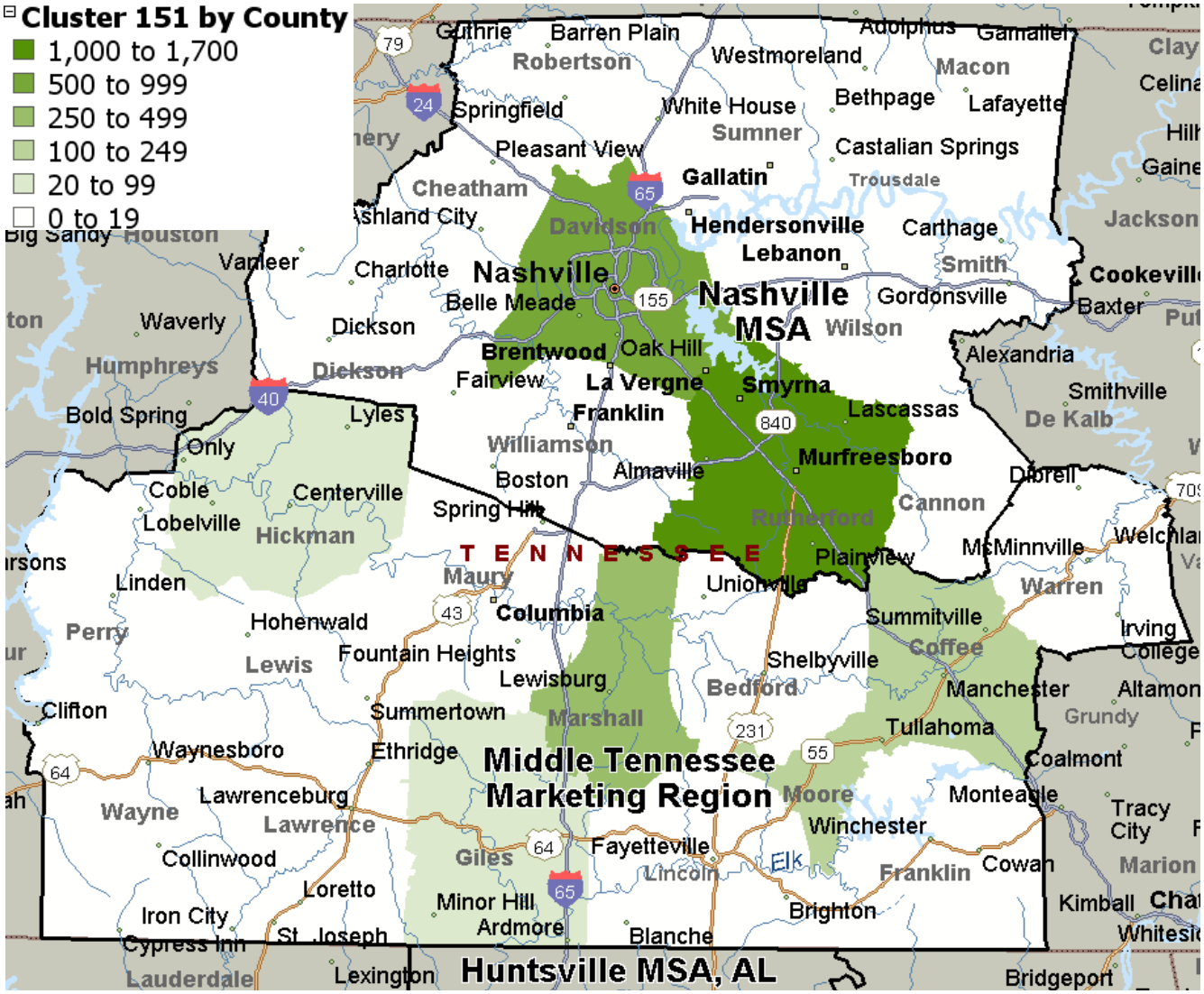
BREWERIES AND DISTILLERIES CLUSTER (151): VITAL SIGNS (TABLE), EMPLOYMENT DISTRIBUTION (MAP), AND SUMMARY PROFILE (CHART)

Cluster Vital Signs (Cluster Number)

Breweries and Distilleries Cluster (151)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	891	Cluster employment
E Change 2002-06	-17.80%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.43	High concentration
LQ2006-2002	-0.94	Decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$68,741	Compensation per employment
Region's C as % of U.S.	111.32%	Significantly higher than U.S.
Change in C 2006-2002 (%)	15.23%	Positive Growth
Productivity (PRO)		
PRO 2006	$908,002	Productivity
Change in PRO 2006-2002 (%)	73.71%	Strong positive trend
Region's PRO as % of U.S.	155.31%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$821	Total Export
EX as % of Output	100.00%	Exports all of output
EX as % of Region's EX	5.28%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$318	Total Imports
Industry Mix Effect on Employment Growth	3%	A relatively fast growing cluster
Regional Effect on Employment Growth	-29%	Negative locational advantage
Technology Sectors (%)	2.57%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF BREWERIES AND DISTILLERIES CLUSTER (151): REGION AND BEYOND


Cluster 151 by County
1,000 to 1,700
500 to 999
250 to 499
100 to 249
20 to 99
0 to 19
Middle Tennessee Marketing Region
Nashville MSA
Huntsville MSA, AL
TENNESSEE
Nashville
Murfreesboro
Columbia
Franklin
Gallatin
Hendersonville
Lebanon
Springfield
Clarksville
Cookeville
Shelbyville
Manchester
Tullahoma
Fayetteville
Lawrenceburg
Waynesboro
Centerville
Dickson
Robertson
Sumner
Wilson
Davidson
Williamson
Rutherford
Maury
Marshall
Bedford
Coffee
Warren
Cannon
Smith
Jackson
Macon
Trousdale
Lewis
Hickman
Perry
Wayne
Lawrence
Giles
Lincoln
Moore
Franklin
Grundy
Marion
Houston
Humphreys
Benton
Carroll
Henry
Stewart
Montgomery
Robertson
Sumner
Wilson
Trousdale
Smith
Jackson
Macon
Clay
Pickett
Fentress
Overton
Putnam
White
DeKalb
Cannon
Rutherford
Cheatham
Davidson
Williamson
Maury
Marshall
Bedford
Coffee
Warren
Grundy
Franklin
Lincoln
Giles
Lawrence
Wayne
Hickman
Perry
Lewis
Lauderdale
Tipton
Haywood
Crockett
Gibson
Carroll
Henry
Weakley
Obion
Dyer
Lake
Obion
Fulton
Hickman
Graves
Calloway
Marshall
Livingston
Crittenden
Union
Caldwell
Trigg
Lyon
Christian
Todd
Logan
Simpson
Allen
Monroe
Barren
Metcalfe
Green
Taylor
Casey
Adair
Cumberland
Clinton
Wayne
McCreary
Whitley
Knox
Anderson
Roane
Morgan
Scott
Campbell
Union
Claiborne
Hancock
Hawkins
Sullivan
Johnson
Carter
Unicoi
Washington
Greene
Hamblen
Jefferson
Cocke
Sevier
Blount
Loudon
Monroe
McMinn
Meigs
Rhea
Bradley
Polk
Hamilton
Sequatchie
Marion
Grundy
Franklin
Coffee
Warren
Cannon

TARGET INDUSTRY CLUSTER: BREWERIES AND DISTILLERIES CLUSTER (151)

Cluster Number: 151
Cluster Name: Breweries and Distilleries
Cluster Status: MATURE (High Concentration with Decrease)
Technology Content: Small

Number of Establishments: 14 (2007 Q1)
Average Wage: $42,320 (2007 Q1)
Higher than region's average wage of $32,192 for 2007 Q1
Total Employment: 853 (2007 Q1)

A

Major Industries Selling Goods and Services to Cluster 151	Major Industries in Breweries and Distilleries Cluster (151)	Major Industries Purchasing Goods and Services from Cluster 151
Wholesale trade	Fruit and vegetable canning and drying	Toilet preparation manufacturing
Truck transportation	Soft drink and ice manufacturing	Distilleries
Toilet preparation manufacturing	Wineries	Personal care services
Plastics plumbing fixtures and all other plastics products	Distilleries	Soft drink and ice manufacturing
Scientific research and development services	Toilet preparation manufacturing	Food services and drinking places
Wood container and pallet manufacturing		Other snack food manufacturing
Advertising and related services		Services to buildings and dwellings
Wholesale trade		Scientific research and development services
Other state and local government enterprises		
Commercial printing		
Distilleries		

B **C** **D**

E

MAJOR COMMODITIES IMPORTED BY CLUSTER 151

Commodities Imported	Million $
Wholesale trade	$44.97
Distilleries	$39.11
Plastics bottle manufacturing	$20.51
Management of companies and enterprises	$19.78
Glass container manufacturing	$19.37
Paperboard container manufacturing	$12.81
Lessors of nonfinancial intangible assets	$12.72
Metal can- box- and other container manufacturing	$12.45
Petroleum refineries	$9.82
All other miscellaneous professional and technical	$9.74
Flavoring syrup and concentrate manufacturing	$7.58

F

MISSING INDUSTRIES FROM CLUSTER 151

Books printing
Breweries

G

MAJOR OCCUPATIONS EMPLOYED BY CLUSTER 151

First-Line Supervisors/Managers of Production and Operating
General and Operations Managers
Laborers and Freight, Stock, and Material Movers, Hand
Maintenance Workers, Machinery
Multiple Machine Tool Setters, Operators, and Tenders, Metal
Packaging and Filling Machine Operators and Tenders
Packers and Packagers, Hand
Paper Goods Machine Setters, Operators, and Tenders
Truck Drivers, Heavy and Tractor-Trailer

CHAPTER VII: STUDY RECOMMENDATIONS AND FUTURE DIRECTIONS

Overall, this study has two sets of recommendations:

(1) cluster-specific recommendations and

(2) recommendations for the MTM Region.

VII.1. Cluster Specific Recommendations

- Based on communalities of commodities imported and occupations employed, we recommend the following four aggregated clusters to stimulate economic growth:
  - Motor Vehicle and Associated Products Cluster
    - Motor Vehicle
    - Rubber Products
    - Plastics Products
  - Advanced Metal Manufacturing Cluster
    - Machine Tools
    - Nondurable Industry Machinery
    - Metalworking and Fabricated Metal Products
  - Information Technology and Precision Instrument Manufacturing Cluster
    - Optical Equipment and Instruments
    - Computer and Electronic Equipment
    - Information Services
  - Agribusiness Cluster
    - Breweries and Distilleries
    - Packaged Goods Products

The following tables, maps, and charts provide detailed information about each aggregate cluster in the MTM region.

Aggregated Cluster 1: Motor Vehicle and Associated Products

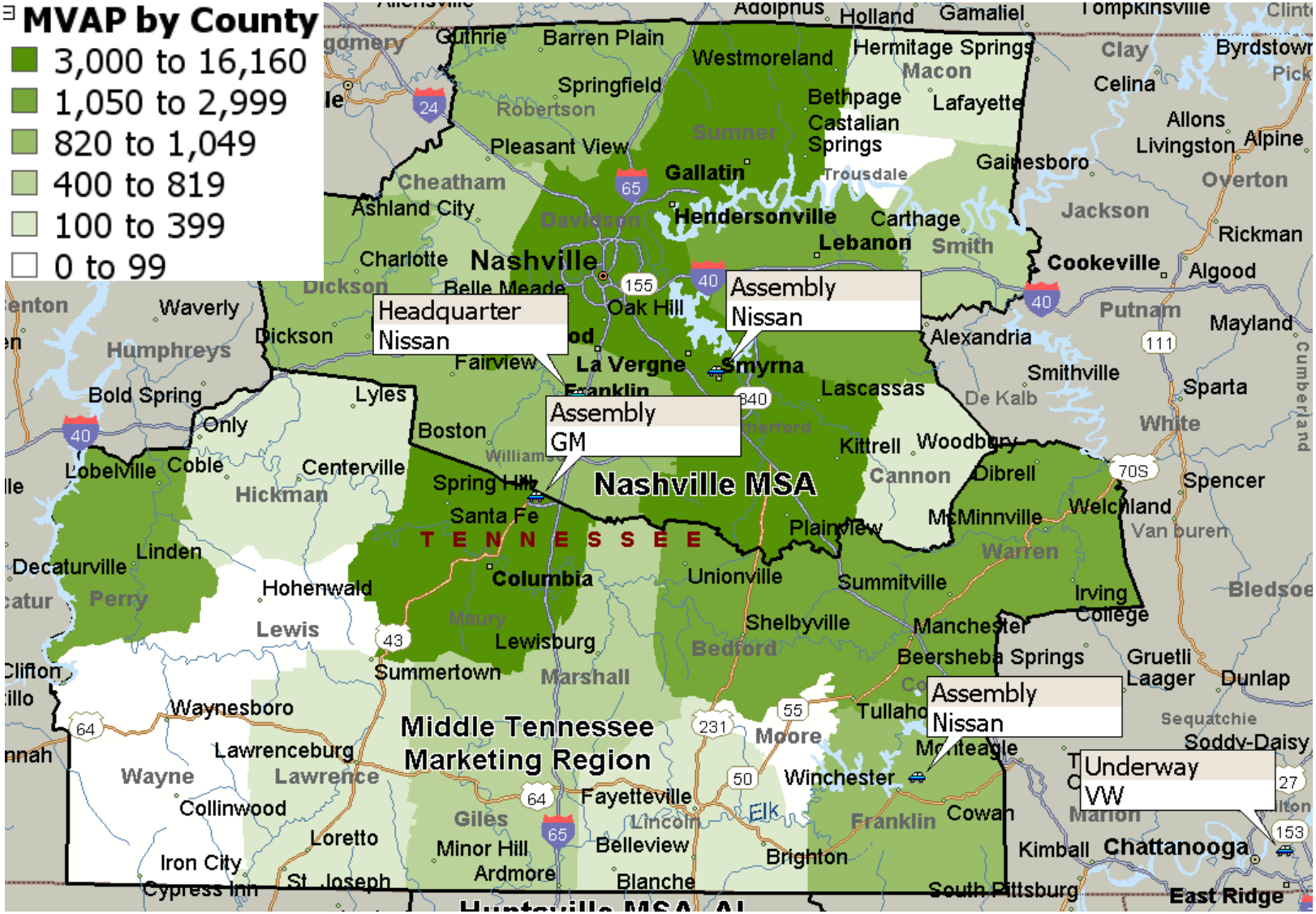
- *Motor Vehicle*
- *Rubber Products*
- *Plastics Products*

Cluster Vital Signs (Cluster Number)

Motor Vehicle and Associated Products (C13, C55, C56)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	15,533	Cluster employment
E Change 2002-06	-7.50%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	6.11	High concentration
LQ2006-2002	-0.45	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$76,656	Compensation per employment
Region's C as % of U.S.	113.14%	Significantly higher than U.S.
Change in C 2006-2002 (%)	14.34%	Positive Growth
Productivity (PRO)		
PRO 2006	$669,760	Productivity
Change in PRO 2006-2002 (%)	48.94%	Strong positive trend
Region's PRO as % of U.S.	161.68%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$7,529	Total Export
EX as % of Output	72.36%	Exports nearly three-fourth of output
EX as % of Region's EX	48.43%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$1,349	Total Imports
Industry Mix Effect on Employment Growth	-14%	A relatively slow growing cluster
Regional Effect on Employment Growth	-2%	Slightly negative locational advantage
Technology Sectors (%)	31.69%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF MOTOR VEHICLE & ASSOCIATED PRODUCTS (C13, C55 & C56)



TARGET INDUSTRY CLUSTER PROFILE: MOTOR VEHICLE AND ASSOCIATED PRODUCTS (C13, C55, C56)

CLUSTER PROFILE: A

Cluster number: C13, C55, C56
Cluster Name: Motor Vehicle and Associated Products
Cluster Status: MATURE (High concentration with slight decrease)
Technology Content: Semi-Technology Intensive

Establishments: 95 (2007 Q1)
Average Wage: $53,984 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 16,070 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Motor Vehicle Parts Manufacturing
Wholesale Trade
Automotive Repair & Maintenance
Truck Transportation
Glass and Glass Products
Automobile & Light Truck Manufacturing
Other Basic Inorganic Chemical Manufact.
Textile and Fabric Finishing Mills
Architectural and Engineering Services
Power Generation and Supply
Plastics Packaging Materials, Film & Sheet
Pesticide & Other Agricultural Chemical
Plastic Material & Resin Manufacturing
Plastics Plumbing Fixtures
Custom Compounding of Purchased Resin

CORE CLUSTER INDUSTRIES IN THE REGION: C

Automobile & Light Truck Manufacturing
Motor Vehicle Body Manufacturing
Travel Trailer & Camper Manufacturing
Motor Vehicle Parts Manufacturing
Other Aircraft Parts and Equipment
Tire Manufacturing
Rubber & Plastics Hose and Belting Man.
Sporting and Athletic Goods Manufact.
Gasket-Packing-and Sealing Device Man.
Bottons-Pins-and All Other Miscellaneous
Custom Compounding of Purchased Resin
Plastics Pipe-Fittings-and Profile
Resilient Floor Covering Manufacturing
Plastics Plumbing Fixtures and All Other
Foam Product Manufacturing

TOP INDUSTRIES BUYING FROM CLUSTER: D

Automobile & Light Truck Manufacturing
Motor Vehicle Parts Manufacturing
Tire Manufacturing
Automotive Repair & Maintenance
Truck Transportation
Waste Management & Remediation Services
Lawn & Garden Equipment Manufacturing
Glass & Glass Products
AC, Refrigeration, and Forced Air Heating
Other Snack Food Manufacturing
Toilet Preparation Manufacturing
Food Services & Drinking Places
Mattress Manufacturing
Pesticide & Other Agricultural Chemical Manufact.

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Motor Vehicle Parts Manufacturing	$3,441
Wholesale Trade	$304
Iron & Steel Mills	**$193**
Semiconductor & Related Device	**$154**
Other Engine Equipment Manufacturing	$134
Management of Companies & Enterprises	$125
Audio & Video Equipment Manufacturing	**$113**
All Other Misc. Professional and Technical	**$106**
Automotive Repair and Maintenance	$87
Tire Manufacturing	$69
Lessors of Nonfinancial Intangible Assets	**$67**
Motor Vehicle Body Manufacturing	**$59**
Ferrous Metal Foundaries	$46
Paint and Coating Manufacturing	$46
Turned Product & Screw-Nut-&Bolt Manu.	**$45**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Audio & Video Equipment Manufacturing
Electric Lamp Bulb & Part Manufacturing
Truck Trailer Manufacturing
Motorcycle, Bicycle & Parts Manufacturing
All Other Transport Equipment Manufacturing
Photographic Film & Chemical Manufacturing
Ammunition Manufacturing
Storage Battery Manufacturing
Primary Battery Manufacturing
Dental Equipment & Supplies Manufacturing
Synthetic Rubber Manufacturing
Cellulosic Organic Fiber Manufacturing
Noncellulosic Organic Fiber Manufacturing
Plastics Bottle Manufacturing

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

General & Operations Managers
Computer Software Engineers, Applications
Computer: Hardware Engineers
Electrical Engineers
Electronics Engineers, Except Computers
Engineers, All Other
First-Line Supervisors/Managers of Production & Operat.
Electrical and Electronic Equipment Assemblers
Compuetr-Controlled Machine Tool Operators
Numerical Tool and Process Control Programmers
Machinists
Art and Design Workers, All Other
Paper Goods Machine Setters, Operators, & Tenders
Life, Physical, and Social Science Technicians, All Other
Printing Machine Operators

Aggregated Cluster 2: Advanced Metal Manufacturing

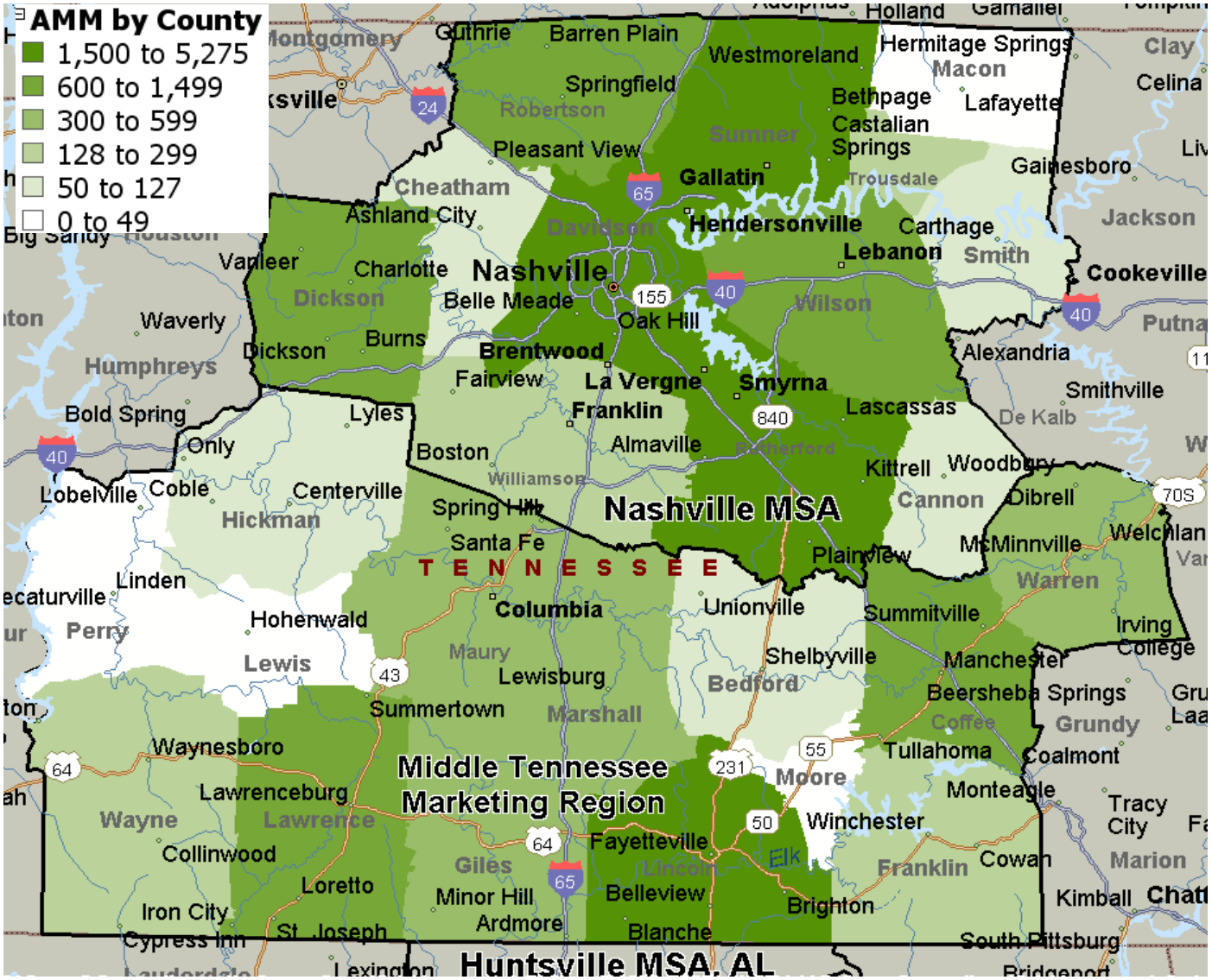
- *Machine Tools*
- *Nondurable Industry Machinery*
- *Metalworking and Fabricated Metal Products*

Cluster Vital Signs (Cluster Number)

Advanced Metal Manufacturing (C22, C32, C41)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	7,436	Cluster employment
E Change 2002-06	-29.48%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.75	High concentration
LQ2006-2002	-1.2	Decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$46,534	Compensation per employment
Region's C as % of U.S.	86.19%	Lower than U.S.
Change in C 2006-2002 (%)	4.50%	Positive Growth
Productivity (PRO)		
PRO 2006	$244,176	Productivity
Change in PRO 2006-2002 (%)	39.77%	Strong positive trend
Region's PRO as % of U.S.	118.64%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$1,575	Total Export
EX as % of Output	86.71%	Exports a large portion of output
EX as % of Region's EX	10.13%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$1,005	Total Imports
Industry Mix Effect on Employment Growth	-12%	A relatively slow growing cluster
Regional Effect on Employment Growth	-26%	Negative locational advantage
Technology Sectors (%)	7.20%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF ADVANCED METAL MANUFACTURING (C22, C32 & C41)



TARGET INDUSTRY CLUSTER PROFILE: ADVANCED METAL MANUFACTURING (C22, C32, C41)

CLUSTER PROFILE: A

Cluster number: C22, C32, C41 **Cluster Name: Advanced Metal Manufacturing** **Cluster Status: MATURE (High concentration with decrease)** **Technology Content: 7.20%**	**Establishments: 197 (2007 Q1)** **Average Wage: $37,824 (2007 Q1)** **Higher than the region's average wage of $33,192** **Total Employment: 5,707 (2007 Q1)**

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B	CORE CLUSTER INDUSTRIES IN THE REGION: C	TOP INDUSTRIES BUYING FROM CLUSTER: D
Motor Vehicle Parts Manufacturing	Sawmill & Woodworking Machinery	Automobile & Light Truck Manufacturing
Wholesale Trade	Plastics & Rubber Industry Machinery	Motor Vehicle Parts Manufacturing
Motor and Generator Manufacturing	**Printing Machinery & Equipment Manufact.**	**Scientific Research & Development Services**
Truck Transportation	**All Other Industrial Machinery Manufact.**	**Motor & Generator Manufacturing**
Telecommunications	Other Commercial & Service Industry Man.	Commercial Printing
Machine Tools	Iron & Steel Forging	Waste Management & Remediation Services
Maintenance & Repair of Nonresidential B.	**Hand & Edge Tool Manufacturing**	**Sawmills**
Sawmills	**Hardware Manufacturing**	**Burial Casket Manufacturing**
Burial Casket Manufacturing	Spring & Wire Product Manufacturing	AC, Refrigeration, and Forced Air Heating
Ball and Roller Bearing Manufacturing	Machine Shops	Machine Shops
Special Tool, Die, Jig & Fixture Manufact.	**Steel Wire Drawing**	**Metal Tank, Heavy Gauge, Manufacturing**
Power Generation & Supply	**All Other Forging & Stamping**	**Aluminum Foundries**
Real Estate	Fabricated Structural Metal Manufacturing	Soft Drink & Ice Manufacturing
Plastics Plumbing Fixtures	Plate Work Manufacturing	Wholesale Trade
Other State & Local Gov. Enterprises	**Metal Window & Door Manufacturing**	**Mattress Manufacturing**

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E		MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F	MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G
Iron & Steel Mills	$121	Food Product Machinery Manufacturing	General & Operations Managers
AC-Refrigeration-& Forced Air Heating	$105	Pump & Pumping Equipment Manufacturing	Maintenance & Repair Workers, General
Wholesale Trade	**$78**	**Other Engine Equipment Manufacturing**	**Assemblers & Fabricators, All Other**
Copper Rolling-Drawing-& Extruding	**$68**	**Scales, Balances & Misc. General Pupose Mach**	**Forging Machine Setters, Operators, & Tenders, Metal**
Motor & Generator Manufacturing	$55	Measuring & Dispensing Pump Manufacturing	Cutting, Punching, & Press Machine Setters, Operators
Management of Companies & Enterpries	$47	Saw Blade & Handsaw Manufacturing	Drilling & Boring Machine Tool Setters, Operators
All Other Misc. Professional and Technical	**$23**	**Small Arms Manufacturing**	**First-Line Supervisors/Managers of Production & Operat.**
Automatic Environmental Control Manu.	**$21**	**Industrial Pattern Manufacturing**	**Welders, Cutters, Solderers & Brazers**
Aluminum Sheet-Plate-& Foil Manufact.	$20	Air Purification Equipment Manufacturing	Bindery workers
Ferrous Metal Foundaries	$18	Industrial & Commercial Fan & Blower Manu.	Crushing, Grinding, & Polishing Machine Setters, Operators
Semiconductors & Related Device	**$17**	**Custom Roll Forming**	**Machinists**
Fabricated Structural Metal Manufacturing	**$7**	**Prefabricated Metal Buildings & Components**	**Truck Drivers, Heavy and Tractor-Trailer**
Hardware Manufacturing	$6	Power Boiler & Heat Exchanger Manufacturing	Industrial Truck & Tractor Operators
Steel Wire Drawing	$6	Conveyor & Conveying Equipment Manufact.	Inspectors, Testers, Sorters, Samplers, & Weighers
Machine Shops	**$5**	**Military Armored Vehicles & Tank Parts Man.**	**Sewing Machine Operators**

Aggregated Cluster 3: Information Technology and Precision Instrument Manufacturing

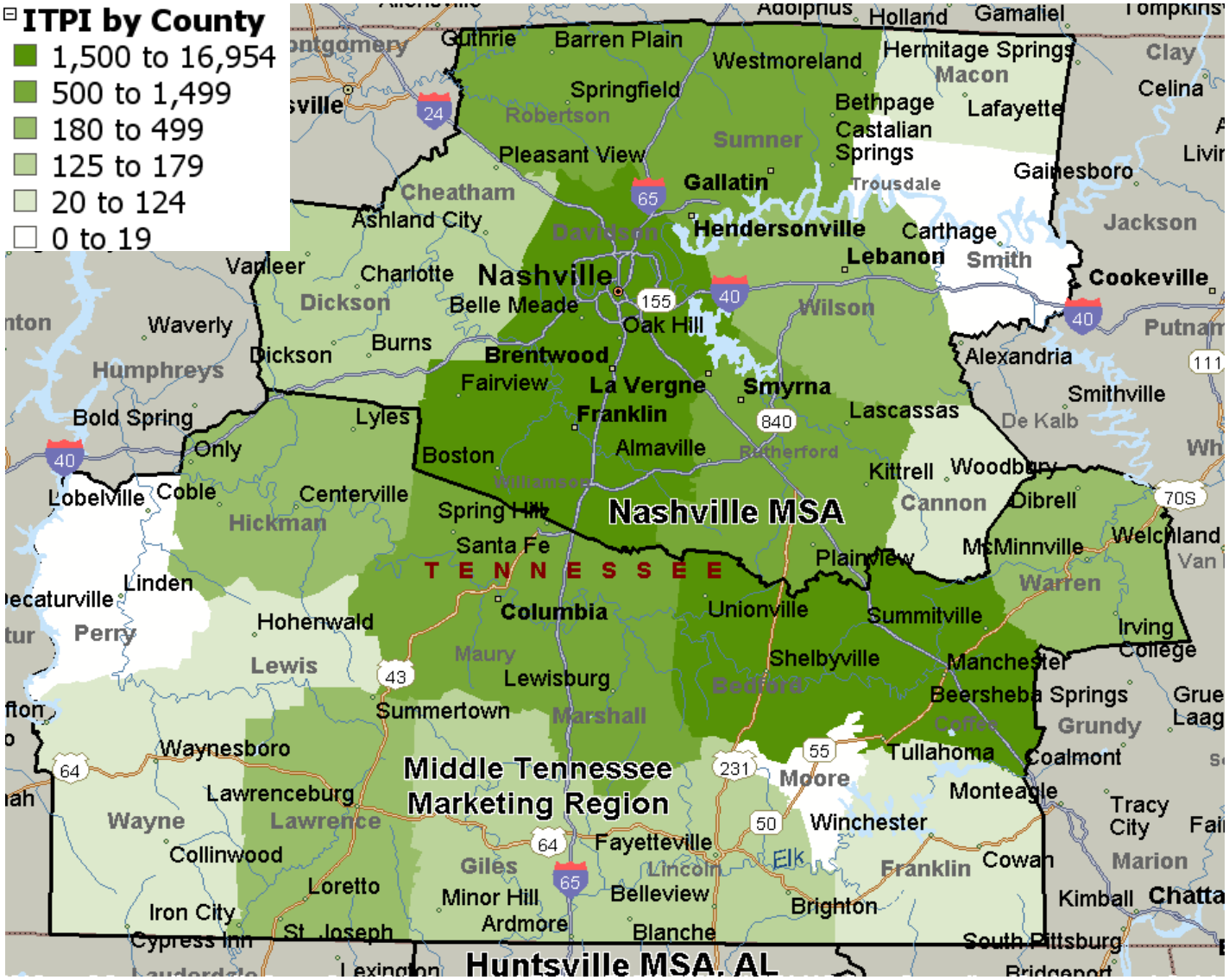
- *Optical Equipment and Instruments*
- *Computer and Electronic Equipment*
- *Information Services*

Cluster Vital Signs (Cluster Number)

Information Technology and Precision Manufacturing (C11, C72, C132)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	5,845	Cluster employment
E Change 2002-06	3.64%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	0.82	Low concentration
LQ2006-2002	0.08	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$44,686	Compensation per employment
Region's C as % of U.S.	74.73%	Lower than U.S.
Change in C 2006-2002 (%)	16.35%	Positive Growth
Productivity (PRO)		
PRO 2006	$178,887	Productivity
Change in PRO 2006-2002 (%)	39.77%	Strong positive trend
Region's PRO as % of U.S.	91.44%	Slightly lower than U.S.
Export (EX)		
EX 2006 (Million $)	$602	Total Export
EX as % of Output	57.59%	Exports little over half of output
EX as % of Region's EX	3.87%	Not a significant player in the region
Imports (IM)		
IM 2006 (Million $)	$357	Total Imports
Industry Mix Effect on Employment Growth	-19%	A relatively slow growing cluster
Regional Effect on Employment Growth	14%	Positive locational advantage
Technology Sectors (%)	39.21%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF INFORMATION TECH. & PRECISION MANUFACTURING (C11, C72 & C132)



TARGET INDUSTRY CLUSTER PROFILE: INFORMATION TECHNOLOGY AND PRECISION INSTRUMENT MANUFACTURING (C11, C72, C132)

CLUSTER PROFILE: A

Cluster number: C11, C72, C132
Cluster Name: Information Tech.& Precision Instrument Manufacturing
Cluster Status: EMERGING (Low concentration with increase)
Technology Content: Semi-Technology Intensive

Establishments: 197 (2007 Q1)
Average Wage: $39,774 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 6,692 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Wholesale Trade
Truck Transportation
Plastics Packaging Materials, Film & Sheet
Office Supplies, Except Paper, Manu.
Sawmills
Plastics Plumbing Fixtures
Wood Container & Pallet Manufacturing
Telecommunications
Architectural and Engineering Services
Accounting & Bookkeeping Services
Household Goods Repair & Maintenance
All Other Electronic Component Manufact.
Scientific Research & Development Servi.
Employment Services
Real Estate

CORE CLUSTER INDUSTRIES IN THE REGION: C

Surgical & Medical Instrument Manufact.
Surgical Appliance & Supplies Manufacturing
Office Supplies, Except Paper, Manufact.
Musical Instrument Manufacturing
Information Services
Data Processing Services
Custom Computer Programming Services
Computer Systems Design Services
Electronic Equipment Repair & Maintenance
Broadcast & Wireless Communications
All Other Electronic Component Manufact.
Industrial Process Variable Instruments
Irradiation Apparatus Manufacturing
Watch-Clock-and Other Measuring
Miscellaneous Electrical Equipment Manu.

TOP INDUSTRIES BUYING FROM CLUSTER: D

Office Supplies, Except Paper, Manufacturing
Surgical Appliance & Supplies Manufacturing
Toilet Preparation Manufacturing
Other Ambulatory Health Care Services
Surgical & Medical Instrument Manufacturing
Veterinary Services
Telecommunications
Motor Vehicle Parts Manufacturing
AC, Refrigeration, and Forced Air Heating
Scientific Research & Development Services
Waste Management & Remediation Services
Data Processing Services
Automobile & Light Truck Manufacturing
All Other Electronic Component Manufacturing
Industrial Process Variable Instruments

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Semiconductor & Related Device	$36
Telecommunications	$30
Wholesale Trade	**$29**
Management of Companies & Enterprise	**$16**
Paperboard Container Manufacturing	$12
All Other Misc. Professional & Technical	$12
Office Supplies-Except Paper-Manufact.	**$9**
Other Basic Organic Chemical Manufact.	**$8**
Architectural & Engineering Services	$7
All Other Electronic Component Manufact.	$7
Synthetic Dye and Pigment Manufact.	**$6**
Plastics Pipe-Fittings-and Profile Shapes	**$5**
Paper and Paperboard Mills	$5
Broadcast & Wireless Communications	$4
Accounting & Bookkeeping Services	**$4**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Photographic Film & Chemical Manufacturing
Plastics Bottle Manufacturing
Audio & Video Reproduction
Magnetic & Optical Recording Media Manu.
Ophthalmic Goods Manufacturing
Software Publishers
Office Machinery Manufacturing
Electronic Computer Manufacturing
Computer Storage Device Manufacturing
Electron Tube Manufacturing
Semiconductors & Related Device Manufact.
Electromedical Apparatus Manufacturing
Search, Detection & Navigation Instruments
Electricity & Signal Testing Instruments
Analytical Laboratory Instrument Manuf.

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

Electromechanical Equipment Assemblers
Maintenance Workers, Machinery
Assemblers and Fabricators, All Other
Broadcast Technicians
Packaging & Filling Machine Operators and Tenders
Mechanical Engineers
First-Line Supervisors/Managers of Production & Operat.
Electrical and Electronic Equipment Assemblers
Mechanical Drafters
Computer, Automated Teller, and Office Machine Repairers
Machinists
Engine and Other Machine Assemblers
Welders, Cutters, Solderers, and Brazers
Welding, Soldering, and Brazing Machine Setters, Operators
General and Operations Managers

Aggregated Cluster 4: Agribusiness

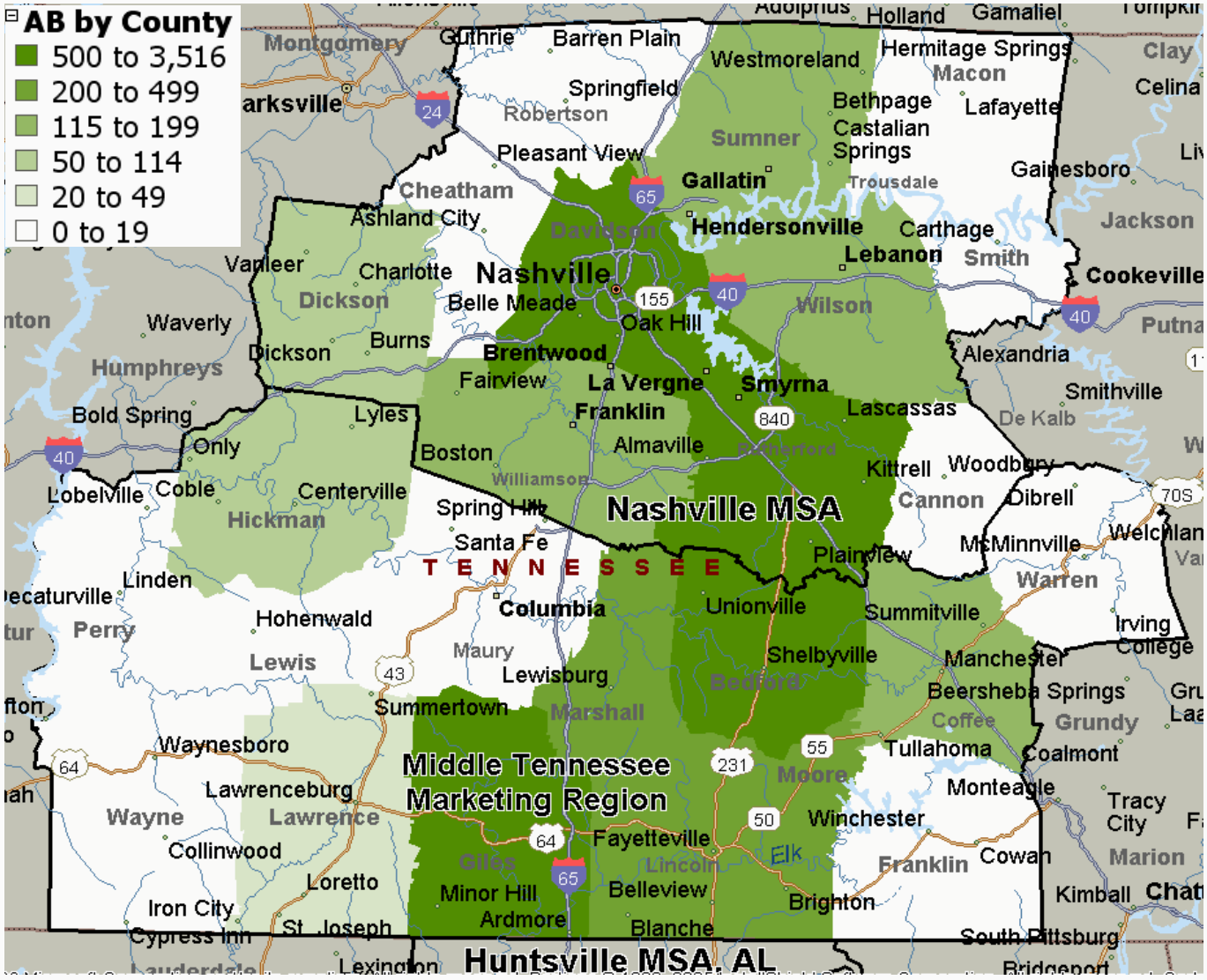
- *Breweries and Distilleries*
- *Packaged Goods Products*

Cluster Vital Signs (Cluster Number)

Agribusiness (C92, C151)		
Data Categories	Indicators	Explanation
Employment (E)		
E2006	3,704	Cluster employment
E Change 2002-06	-6.28%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.55	High concentration
LQ2006-2002	-0.26	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$47,171	Compensation per employment
Region's C as % of U.S.	104.28%	Significantly higher than U.S.
Change in C 2006-2002 (%)	16.69%	Positive Growth
Productivity (PRO)		
PRO 2006	$466,225	Productivity
Change in PRO 2006-2002 (%)	72.94%	Strong positive trend
Region's PRO as % of U.S.	126.30%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$1,528	Total Export
EX as % of Output	88.55%	Exports nearly all of output
EX as % of Region's EX	9.83%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$618	Total Imports
Industry Mix Effect on Employment Growth	-10%	A relatively slow growing cluster
Regional Effect on Employment Growth	-5%	Negative locational advantage
Technology Sectors (%)	1.00%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

EMPLOYMENT DISTRIBUTION OF AGRIBUSINESS (C92 & C151)


AB by County
500 to 3,516
200 to 499
115 to 199
50 to 114
20 to 49
0 to 19
Nashville MSA
Middle Tennessee Marketing Region
Huntsville MSA, AL
TENNESSEE
Nashville
Brentwood
Franklin
Hendersonville
Gallatin
Columbia
Lewisburg
Shelbyville
Murfreesboro
Smyrna
La Vergne
Lebanon
Springfield
Clarksville
Montgomery
Guthrie
Barren Plain
Westmoreland
Hermitage Springs
Macon
Lafayette
Bethpage
Castalian Springs
Sumner
Trousdale
Gainesboro
Jackson
Cookeville
Putnam
Wilson
Carthage
Smith
Alexandria
Smithville
De Kalb
Cannon
Dibrell
Woodbury
Kittrell
Lascassas
Pleasant View
Cheatham
Ashland City
Davidson
Robertson
Dickson
Burns
Waverly
Humphreys
Bold Spring
Lyles
Only
Coble
Centerville
Hickman
Lobelville
Perry
Lewis
Linden
Hohenwald
Maury
Marshall
Summertown
Waynesboro
Lawrenceburg
Wayne
Lawrence
Collinwood
Loretto
Iron City
Cypress Inn
St. Joseph
Lexington
Minor Hill
Ardmore
Belleview
Blanche
Fayetteville
Giles
Lincoln
Elk
Moore
Bedford
Coffee
Grundy
Tullahoma
Coalmont
Manchester
Beersheba Springs
Summitville
Unionville
Plainview
Spring Hill
Santa Fe
Williamson
Boston
Almaville
Rutherford
Oak Hill
Belle Meade
Fairview
Charlotte
Van Leer
Winchester
Monteagle
Tracy City
Marion
Kimball
Brighton
Franklin
Cowan
Warren
McMinnville
Irving College
Welchlan
Harpeth
Beech
Big Harpeth
Big Barren
Big Duck
Big Swan
Big Sandy
Big Bear
Big Cypress
Big Creek
Big Hurricane
Big Bayou
Big Bend
Big Bluff
Big Bluff Creek
Big Bluff Creek
Big Bluff Creek

TARGET INDUSTRY CLUSTER PROFILE: AGRIBUSINESS (C92, C151)

CLUSTER PROFILE: A

Cluster number: C92, C151
Cluster Name: Agribusiness
Cluster Status: MATURE (High concentration with slight decrease)
Technology Content: Small

Establishments: 36 (2007 Q1)
Average Wage: $35,533 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 4,041 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Poultry and Egg Production
Poultry Production
Cattle Ranching and Farming
Wholesale Trade
Truck Transportation
Animal Production, Except Cattle & Poultry
Plastics Packaging Materials, Film & Sheet
Toilet Preparation Manufacturing
Plastics Plumbing Fixtures
Scientific Research and Development Serv.
Wood Container and Pallet Manufacturing
Distillleries
Commercial Printing
Advertising and Related Services
Other State and Local Government Enter.

CORE CLUSTER INDUSTRIES IN THE REGION: C

Fruit and Vegetable Canning and Drying
Soft Drink and Ice Manufacturing
Wineries
Distilleries
Toilet Preparation Manufacturing
Confectionery Manufacturing From Purchased
Animal-Except Poultry-Slaughtering
Meat Processed from Carcasses
Poultry Processing
Bread and Bakery Product-Except Frozen
Other Snack Food Manufacturing
Mayonnaise-Dressing-and Sauce Manufact.
All Other Food Manufacturing

TOP INDUSTRIES BUYING FROM CLUSTER: D

Poultry Processing
Leather & Hide Tanning and Finishing
Animal-Except Poultry-Slaughtering
Other Snack Food Manufacturing
Toilet Preparation Manufacturing
Distilleries
Personal Care Services
Soft Drink and Ice Manufacturing
Services to Building and Dwellings
Scientific Research and Development Services

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Wholesale Trade	$91
Management of Companies & Enterprises	$77
Distilleries	**$39**
Paperboard Container Manufacturing	**$30**
Plastics Bottle Manufacturing	$21
Glass Container Manufacturing	$19
All Other Misc. Professional & Technical	**$19**
Poultry & Egg Production	**$17**
Metal Can-Box-and Other Container Man.	$17
Petroleum Refineries	$17
Fats & Oils Refining and Blending	**$11**
Grain Farming	**$9**
Plastics Pipe-Fittings-and Profile Shapes	$9
Flour Milling	$9
Flavoring Syrup & Concentrate Manufact.	**$8**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Breakfast Cereal Manufacturing
Coffee and Tea Manufacturing
Confectionery Manufact. from Cacao Beans
Cookie & Cracker Manufacturing
Dry Pasta Manufacturing
Fats & Oils Refining and Blending
Flavoring Syrup & Concentrate Manufacturing
Frozen Cakes & Other Pastries Manufacturing
Frozen Food Manufacturing
Mixes & Dough Made from Purchased Flour
Nonchocolate Confectionery Manufacturing
Roasted Nuts & Peanut Butter Manufacturing
Breweries
Spice and Extract Manufacturing
Seafood Product Preparation & Packaging

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

Maintenance Workers, Machinery
Packaging & Filling Machine Operators and Tenders
First-Line Supervisors/Managers of Production & Operat.
Bakers
Food Preparation Workers
Industrial Truck and Tractor Operators
Inspectors, Testers, Sorters, Samplers, and Weighers
Janitors & Cleaners, Except Maids and Housekeeping
Laborers & Freight, Stock, and Material Movers, Hand
Multiple Machine Tool Setters, Operators, & Tenders
General and Operations Managers
Packers & Packagers, Hand
Paper Goods Machine Setters, Operators, and Tenders
Truck Drivers, Heavy and Tractor-Trailer

VII.2. Recommendations for the MTM Region

VII.2.a. Regional Level Marketing

- Develop a list of target industries based on the cluster analysis .
  - Rural community leaders should work together to market the region as a "region" rather than individual counties.
    - This requires a strong commitment on the part of leadership to work together to promote the region using multiple avenues:
      - Marketing materials and
      - Business expos and trade shows.
  - Community leaders should communicate with existing businesses to market their products and brand names.
    - This will further promote successful business recruitment to the region.

VII.2.b. Regional Level Workforce Analysis

- Availability and quality of workforce are critically important for a region to improve its economic well-being.
  - Engage the State, ECD, and Department of Labor and Workforce Development for more comprehensive study in the region:
    - Unemployed vs. underemployed,
    - Qualities of unemployed and underemployed, and
    - Type of workers (occupation).
  - Engage TVA, USDA, and EDA to support the comprehensive review of the state of workforce in rural areas.

VII.2.c. In-Depth Cluster Needs Assessment

- Now that we identified target clusters, the next step is to conduct an in-depth needs assessment for each of the aggregated clusters.
  - This will involve but not be limited to
    - Identifying a champion from industry for each of the aggregated clusters;

- Conducting several topical focus group meetings:
  - Cluster workforce,
  - Cluster supply-chain, and
  - Other issues; and
- Interviewing the prominent members of the cluster to identify cluster-specific investment areas to increase regional competitiveness.

VII.2.d. Emerging Clusters/Areas: High-Tech

Interviews and surveys identified several potential/emerging clusters in the region. One potential area is

- Aerospace and Defense/Alternative Energy/High Tech.

The region has all the necessary ingredients to be a high-tech corridor. To cite a few:

- The region's own Arnold Engineering and Development Center (AEDC) and existing and potential developments just south of the border (Huntsville MSA) constitute the seed of this potential corridor:
  - AEDC (Engine Testing and Flight Simulation, Coffee and Franklin Counties),
  - Missile Defense System (Huntsville MSA), and
  - Redstone Arsenal Expansion (Huntsville MSA) as part of the Base Realignment and Closure (BRAC) Commission recommendations.
- A cross-border synergy is necessary to activate this corridor.

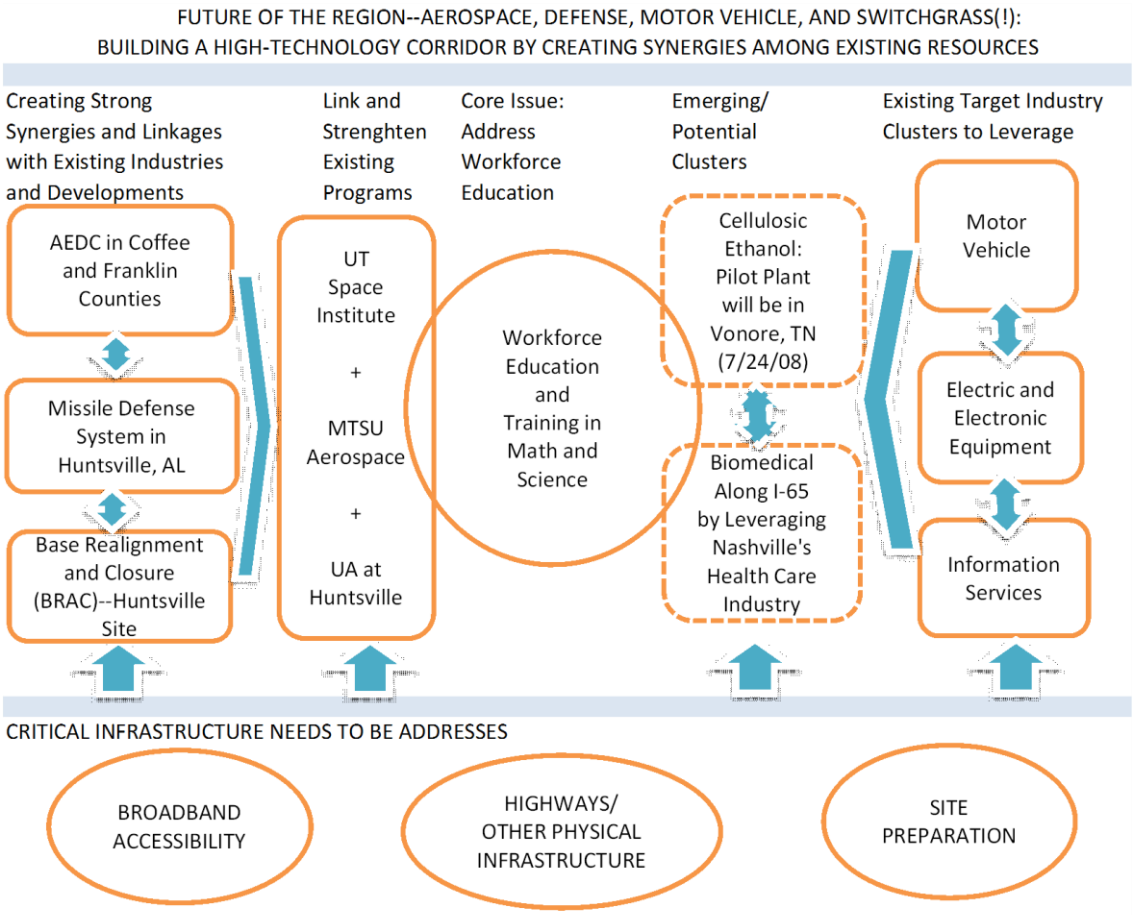
However, in order for a region to attract high-tech companies, its "mega foundations" must be in place. It is well-known that in order to attract an auto manufacturer to a region, that region must have a mega site.

- To use a similar analogy, a region must have three foundations intact to attract high-tech and high-paying jobs:
  - Educated Workforce
    - Fast-track training facilities at the regional level

- Improving K-12 system
- Setting up branch campuses of area universities

- Information Technology (Broadband) Infrastructure
  - Expanding broadband access throughout the rural communities
- Physical Infrastructure (Including Highways)
  - Site preparation
  - Aging infrastructure in rural areas
  - Highways (I-64)

The following chart further summarizes the linkages and synergies the MTM region should activate to have a successful high-tech/defense industry corridor in the region.



VII.2.e. Emerging Clusters/Areas: Tourism

Interviews and surveys identified several potential/emerging clusters in the region. Another potential area is

- Tourism/Agribusiness.

Potential for tourism-based economic development is considerable in the region.

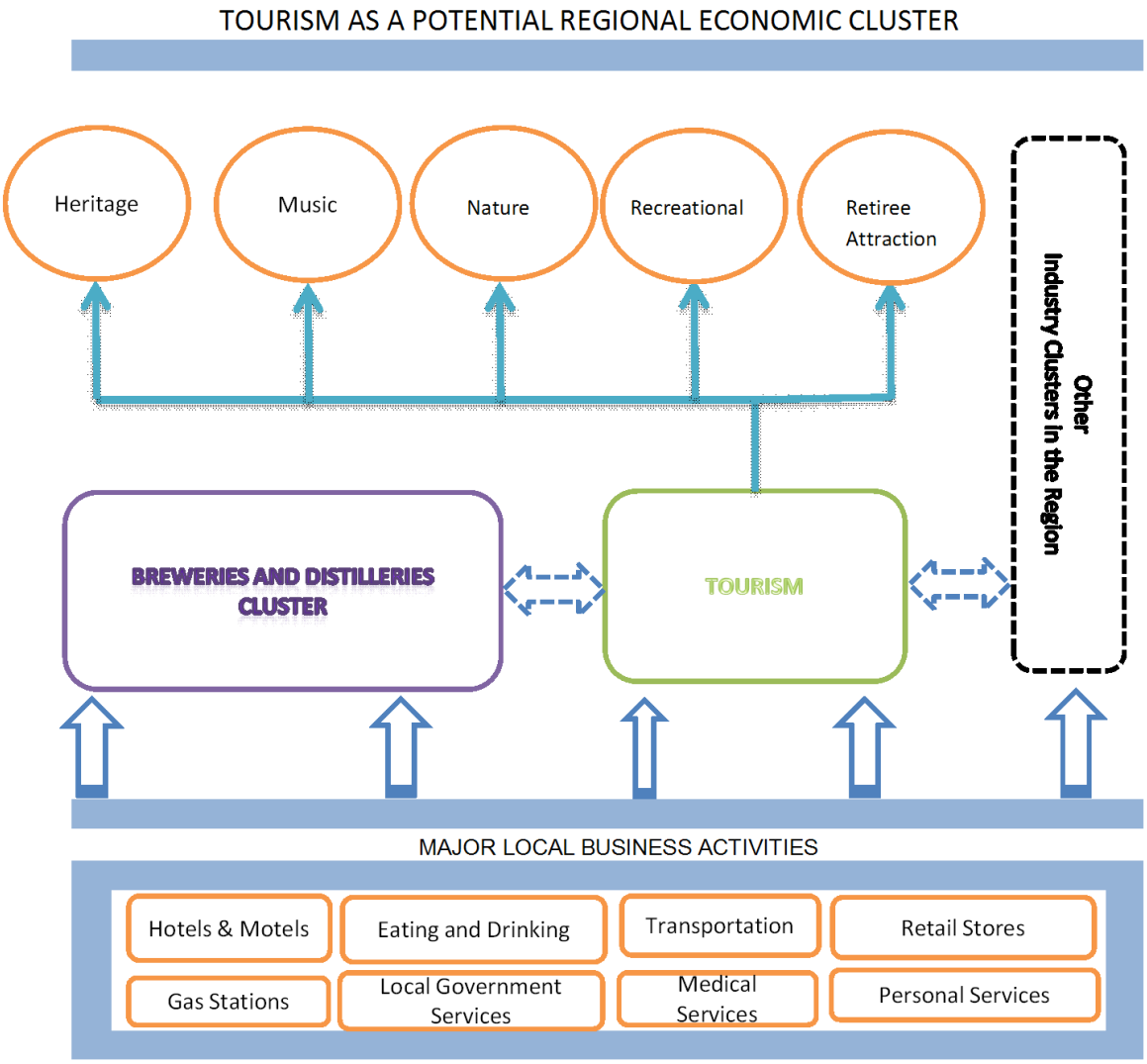
The region's potential for TOURISM:

- The region has a diverse set of brand names to leverage for this purpose:
  - Major world-renowned brands (Jack Daniels, George Dickel and Bonnaroo) and
  - In addition, the elephant sanctuary in Lewis, "farm community" in Lewis, gospel music in Lawrence, Amish community in

Lawrence, Walking Horse Celebrations in Bedford, and Mule Day in Maury, among others.

- In addition, regional diversity in terms of economic development also necessitates different sets of economic development strategies.
    - The Perry, Lewis and Wayne corridor could be successfully connected to the region.

In focusing on tourism, we recommend a broader perspective to connect leisure tourism with retiree development. Furthermore, the MTM region already has strength in breweries and distilleries. The following chart lays out the potential avenues for creating a broader tourism cluster in the MTM region.



VII.2.f. Specific Policy Priorities

- ☐ Small businesses constitute a significant percent of establishments and jobs in the region.
  - ◘ A significant number of these businesses employ 1-9 people.
- ☐ Business incentives available at the state and local level often bypass these businesses.
- ☐ Even if these small businesses are eligible for certain incentives, bureaucratic procedures discourage them from going through the process.

- **Community leaders should work with state officials to revise existing business incentive requirements to encourage small business formation and entrepreneurship in rural communities.**

VIII. DATA AND REFERENCES

Throughout this study, we consulted a significant number of empirical and theoretical works on cluster analyses. Among them, we benefited from the following selected references to a great extent.

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Steiner, M. (1998) The discrete charm of clusters: An introduction. In M. Steiner (Eds.), *Cluster and Regional Specialization*, 1-17. London: Pion Limited.

DATA SOURCES

The following sources of data are frequently utilized to gain insights about the regional socioeconomic dynamics:

IMPLAN Professional www.implan.com

Census Bureau www.census.gov

American Community Survey www.census.gov

Bureau of Labor Statistics www.bls.gov

Bureau of Economic Analysis www.bea.gov

www.youreconomy.org

Woods & Poole Economics www.woodsandpoole.com

IRS County to County Migration Data

USDA/ERS www.ers.usda.gov

Tennessee Department of Labor and Workforce Development ES202 Data

IX. APPENDICES: PRESENTATIONS

1. Final Study Presentation

2. Chapter III. Economic Diversity

3. Chapter III. Underemployment

4. Chapter IV. Business Interview Results

5. Chapter IV. Business Survey Results

6. Chapter VI. Gaps in Clusters

7. Chapter VI. Commodity Imports by Cluster

8. Chapter VI. Linkages between Regional Clusters and National Technology Clusters

MIDDLE TENNESSEE MARKETING REGION (MTM REGION)

Regional Economic Dynamics and Target Industry Analysis

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Presentation Outline

I. Regional Overview

II. Comparative Economic and Demographic Dynamics

III. Regional Socio-Economic Dynamics

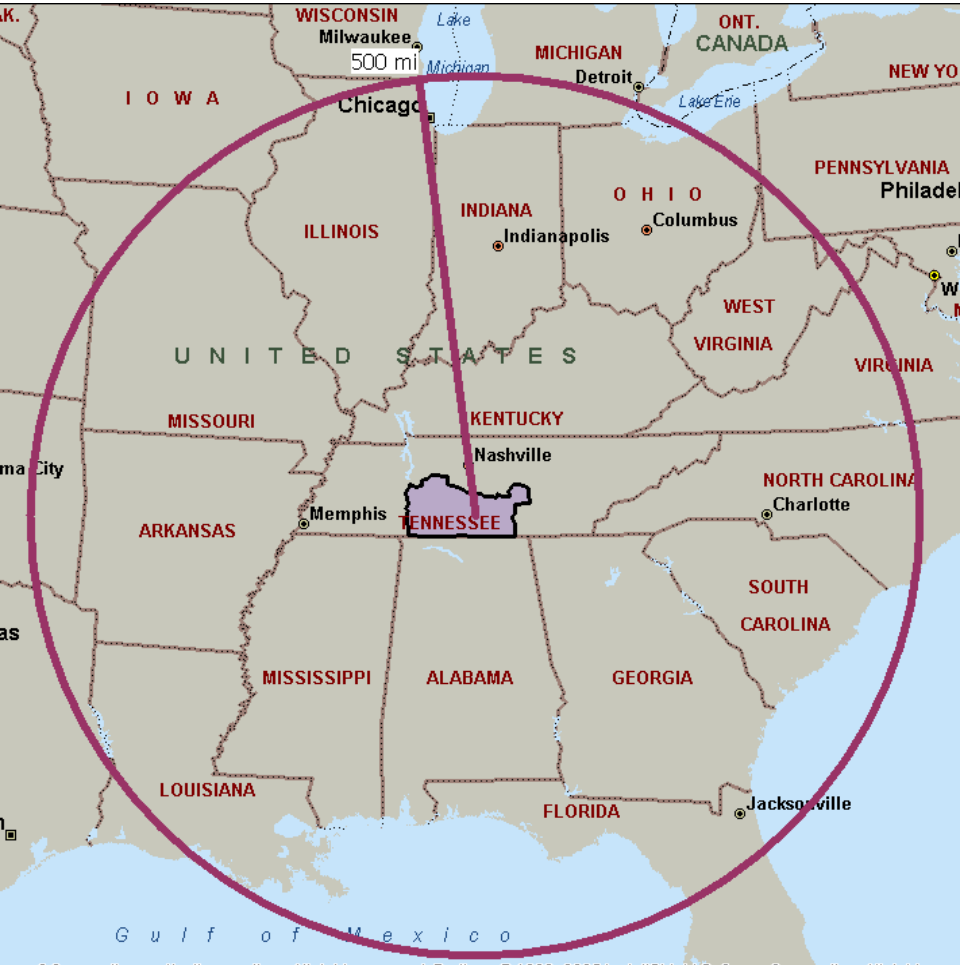
IV. Regional Strengths and Weaknesses

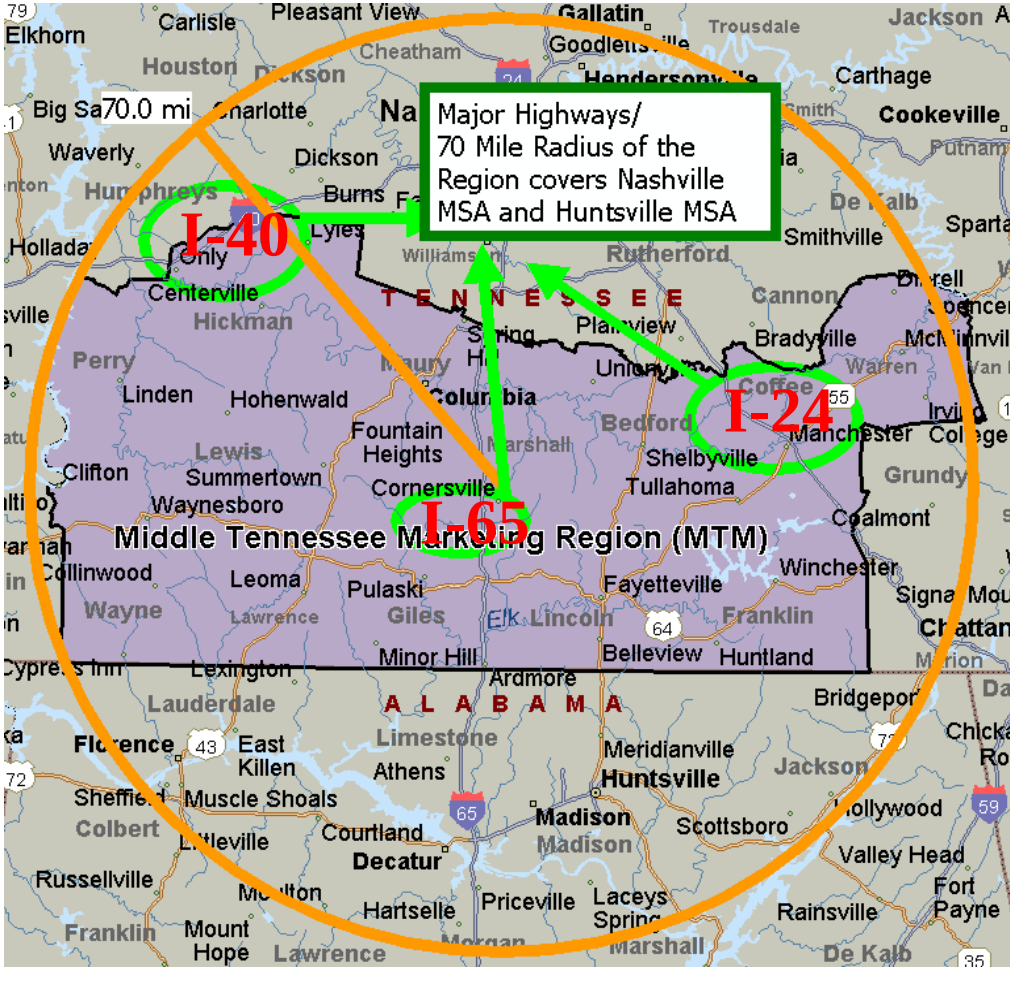
V. Industry Clusters: An Overview

VI. Target Clusters

VII. Recommendations and Conclusion

I. Regional Overview





I. Regional Overview

Strategically Located

- Strategically located between Nashville MSA and Huntsville MSA, AL, the region includes the following 14 counties:
  - Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Perry, Warren and Wayne

I. Regional Overview

Logistics, Logistics, Logistics!!!

- Region has access to nearly 2.5 million population within 70 mile radius
- These 14 counties represent about 7.5 percent of TN population, 6.12 percent of TN employment, 7.23 percent of TN households
  - MTM Region's average productivity is higher than the U.S. productivity, while income per capita and average wage 69 and 67 percent of the U.S. average, respectively

Table III.1: Region At A Glance (2006)

	Middle Tennessee Marketing Region	
Indicators	MTM Region	% of Tennessee
Population	452,448	7.49%
Employment	221,847	6.12%
Number of Industries	304	63.07%
Households	178,328	7.23%
Total Personal Income	$11,336,690,000	5.81%
Output	$31,770,393,000	6.52%
Value-Added	$12,568,282,000	5.15%
Per Capita Indicators	**MTM Region**	**As % of United States**
Income per capita	$25,056	69.07%
Productivity	$143,209	101.00%
Gross regional product per capita	$27,778	63.03%
Average wage	$28,853	67.17%

Data Source: IMPLANpro, www.census.gov & BERC estimates

I. Regional Overview

Logistics, Logistics, Logistics!!!

While strategically located between two metro areas, the region itself is primarily rural

Map III.2: Rural-Urban Continuum

Source: USDA/ERS & BERC Estimates

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II. Comparative Economic and Demographic Dynamics: Population

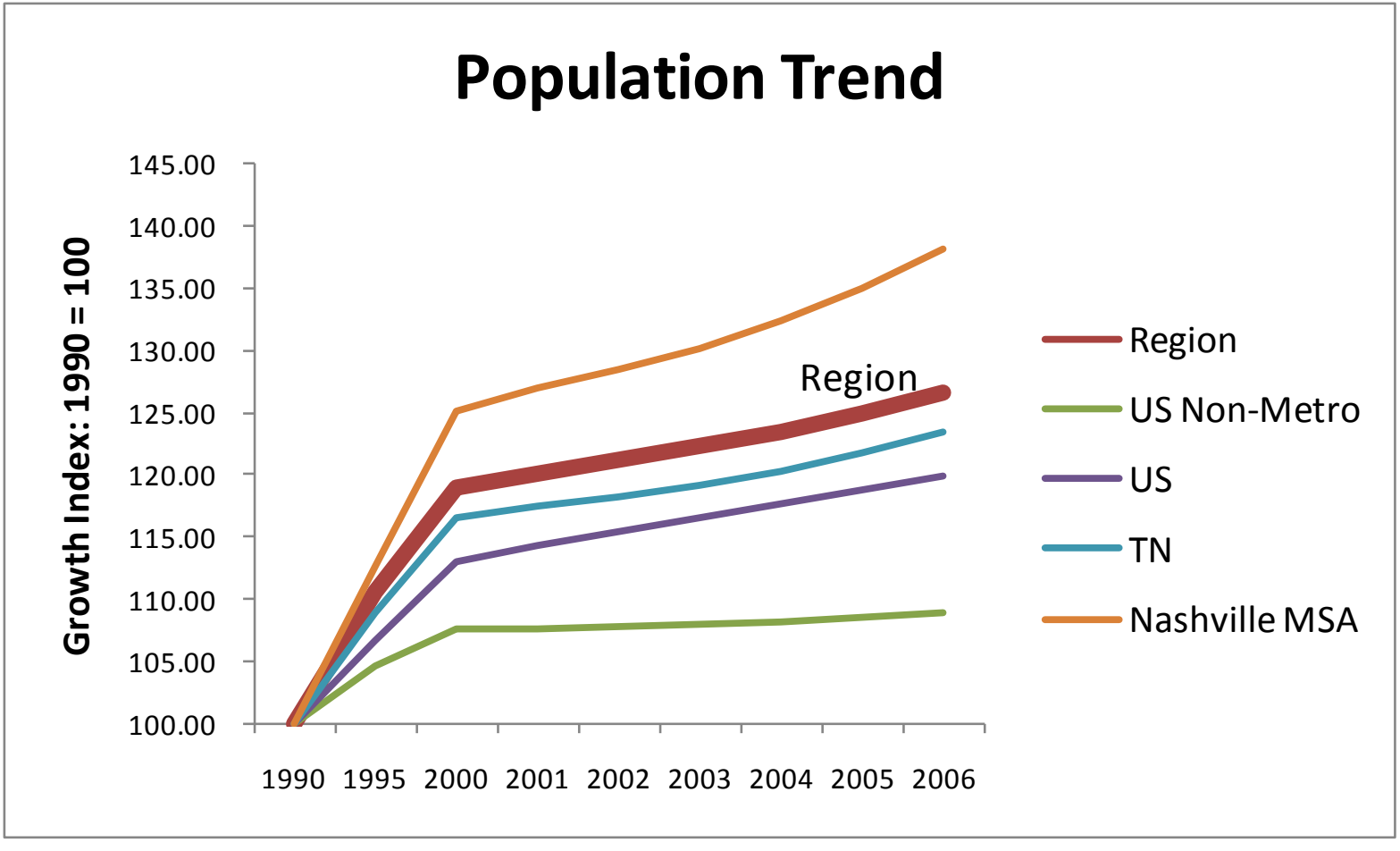
- Population is healthier
- High percentage of aging population
- Population growth driven by migration

Source: Woods & Poole, Economics, Census Bureau & BERC Estimates

II. Comparative Economic and Demographic Dynamics

POPULATION AND POPULATION GROWTH

- Population growth trend is healthier in the region

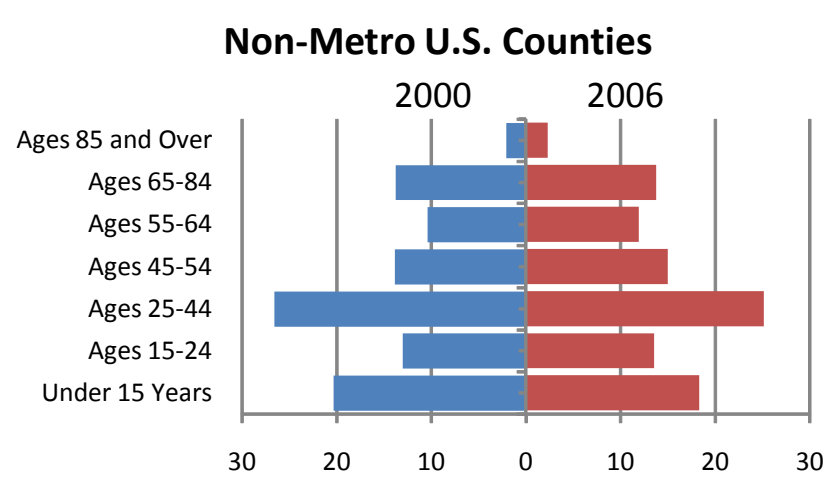


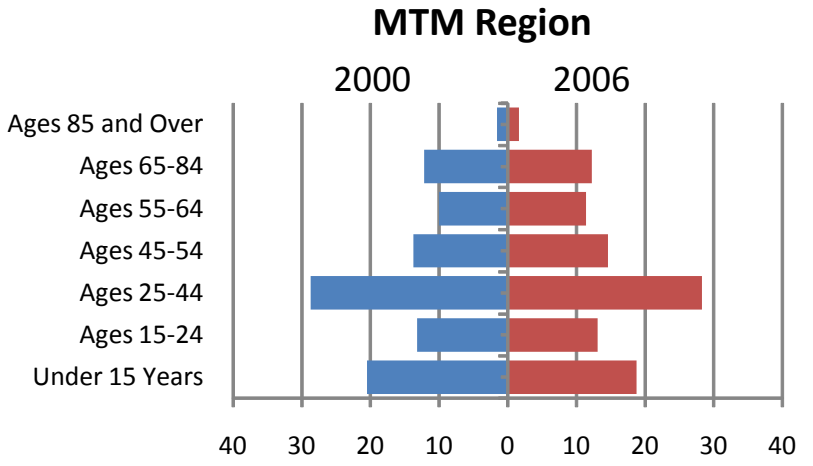
Source: Woods & Poole, Economics, Census Bureau & BERC Estimates

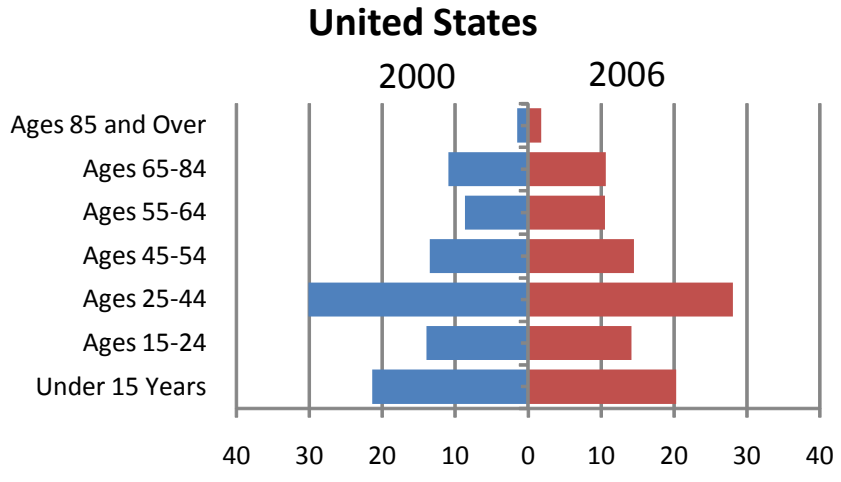
II. Comparative Economic and Demographic Dynamics

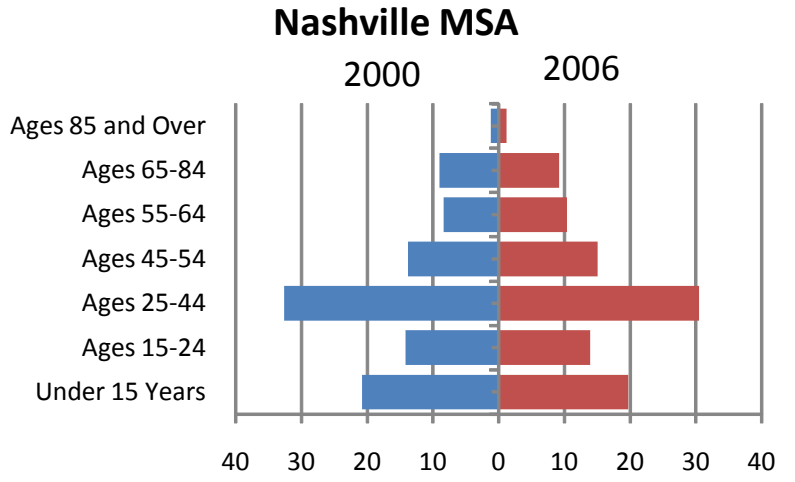
POPULATION AND POPULATION GROWTH

- Rural counties and the region have relatively higher percent of aging population





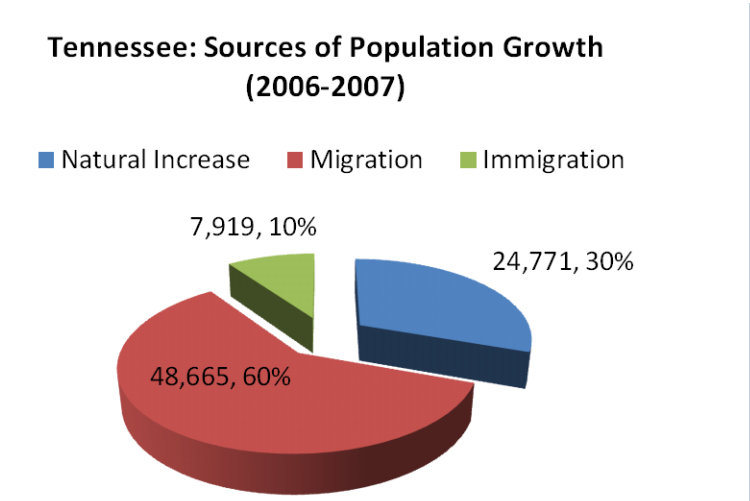


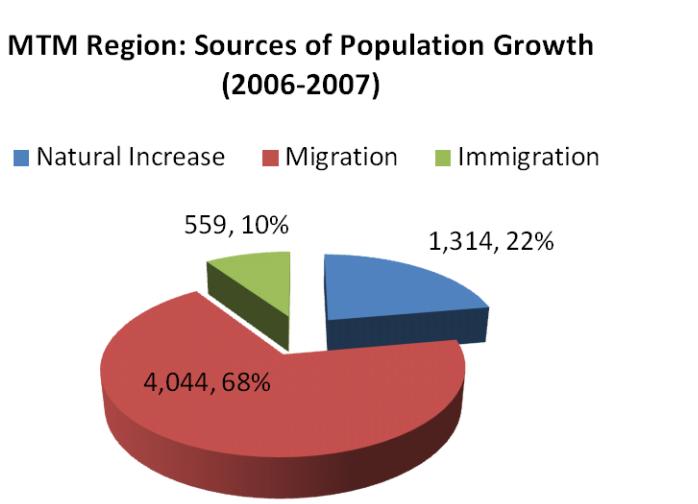


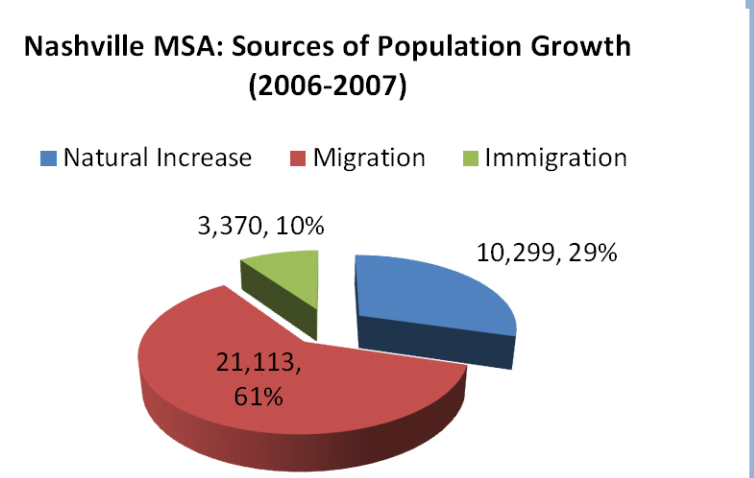
II. Comparative Economic and Demographic Dynamics

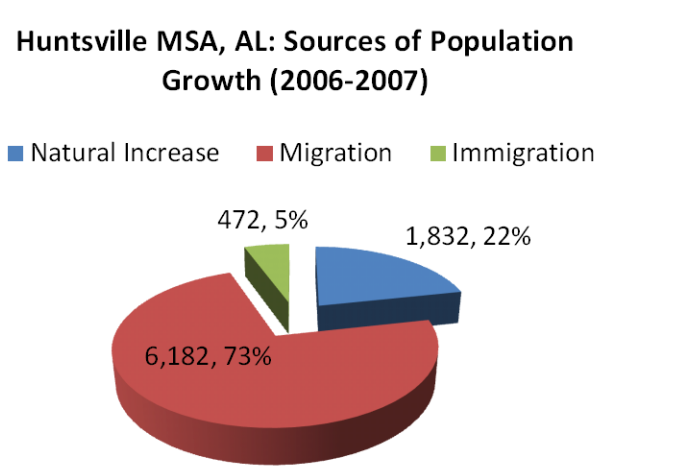
POPULATION AND POPULATION GROWTH

- Region's recent population growth is primarily driven by migration









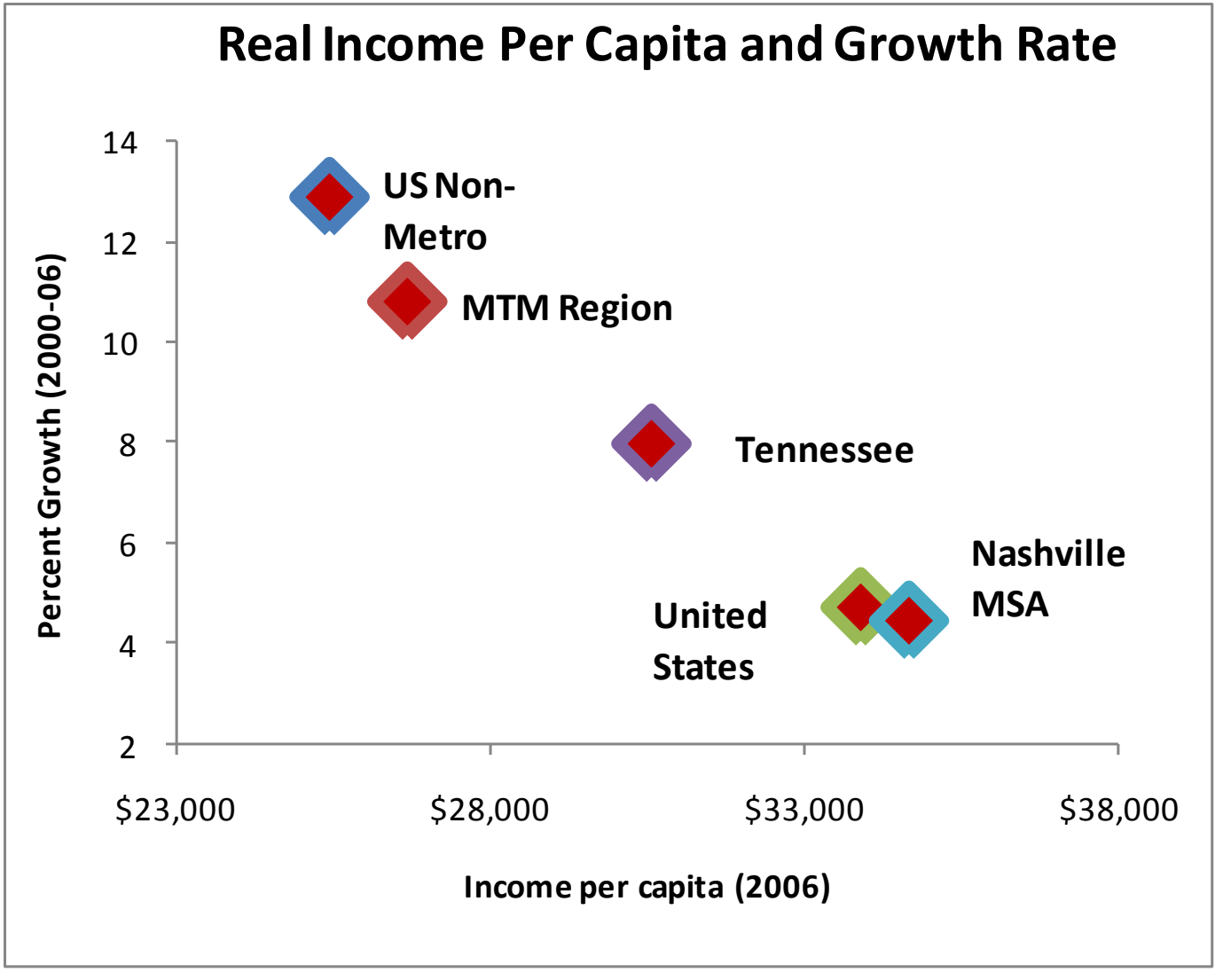
II. Comparative Economic and Demographic Dynamics: Per Capita Income

- Growth is up, lower than State, Nashville, and United States
- 21% less than United States average

Source: Woods & Poole, Economics, BEA & BERC Estimates

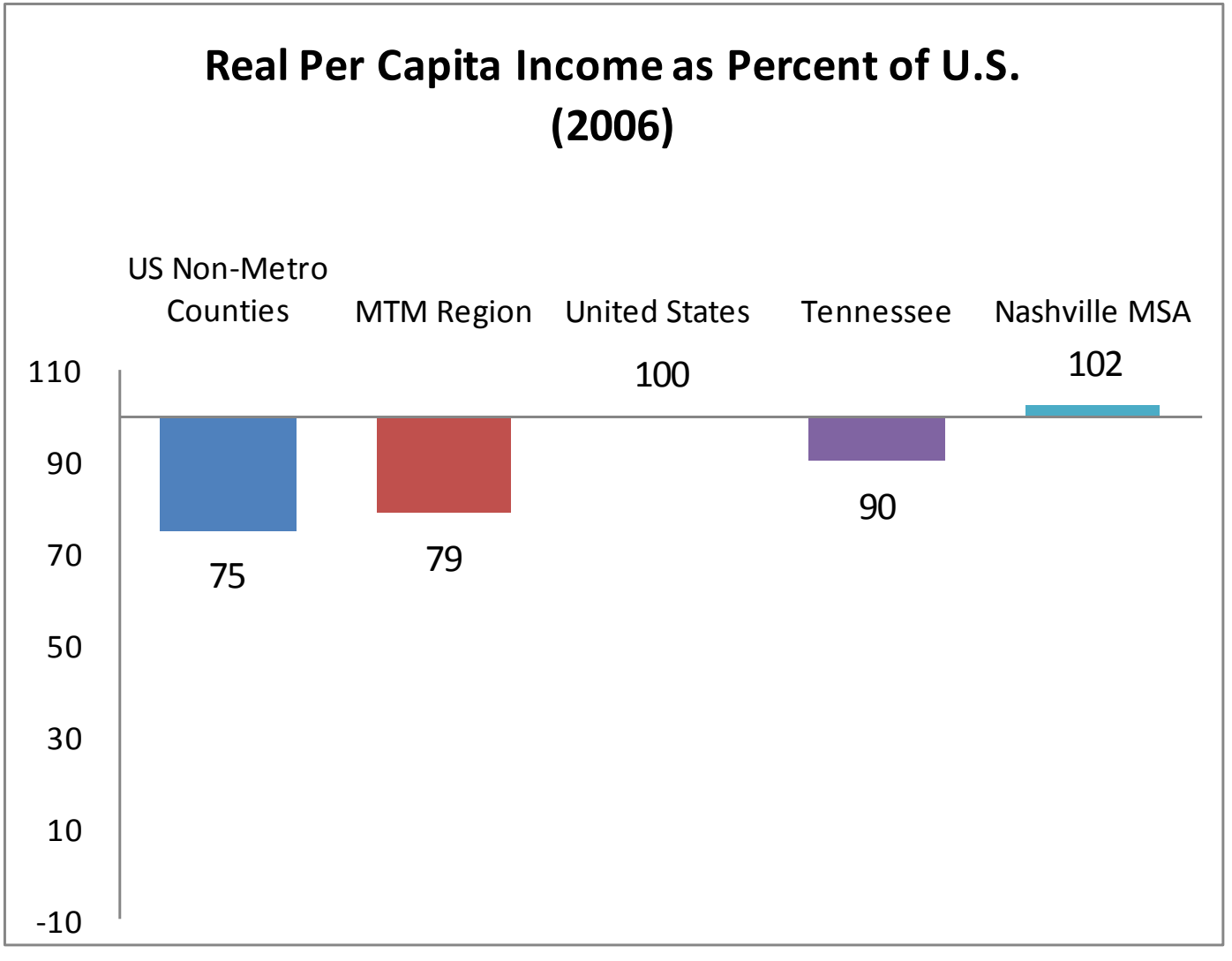
II. Comparative Economic and Demographic Dynamics: Per Capita Income

- Growth is up, but significantly lower than Tennessee, U.S. and Nashville



II. Comparative Economic and Demographic Dynamics: Per Capita Income

- Region's per capita income 21 percent less than U.S. average



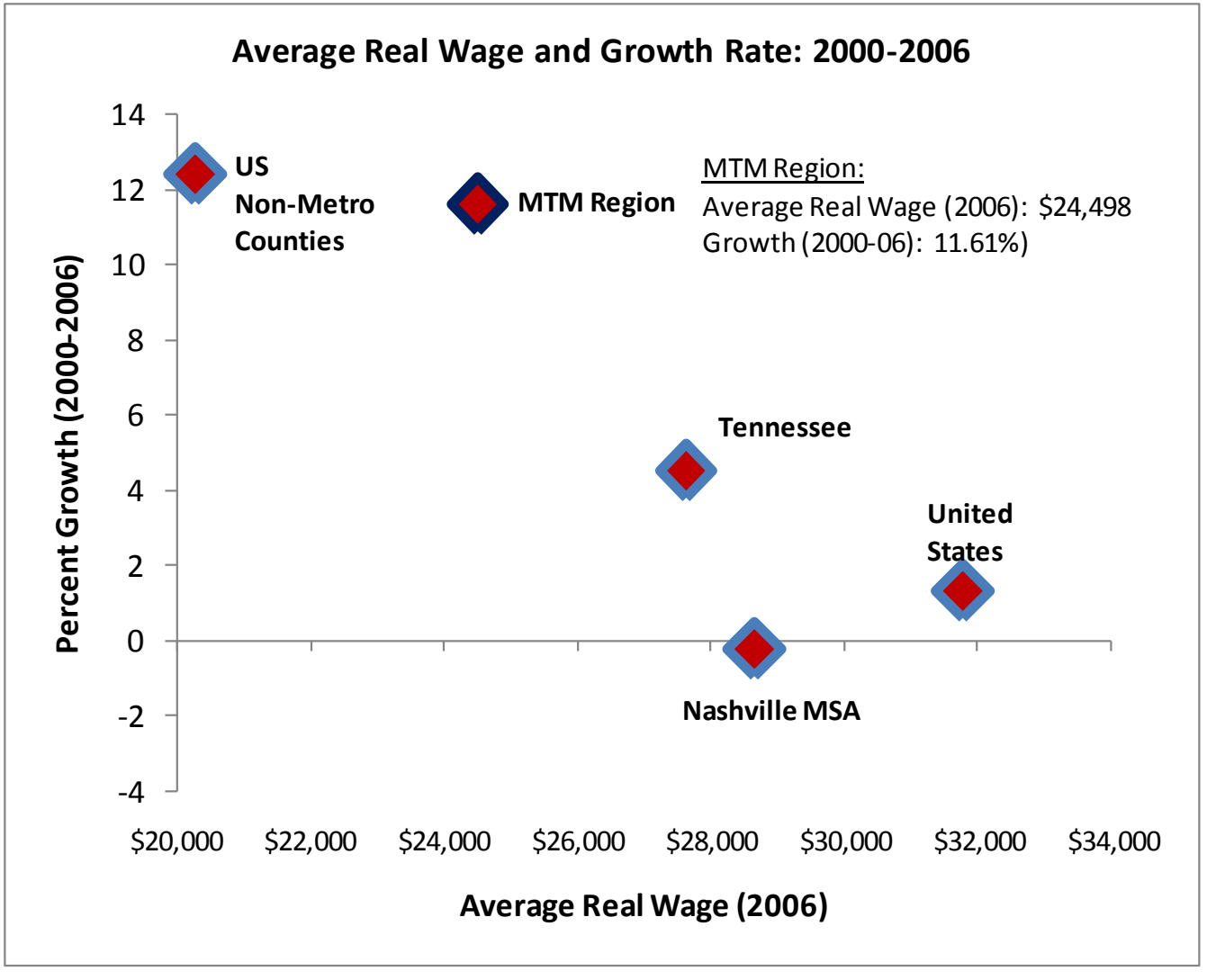
II. Comparative Economic and Demographic Dynamics: Average Wage

- Growth is significant, lags State, Nashville and United States
- 23% less than United States average

Source: Woods & Poole, Economics, BEA & BERC Estimates

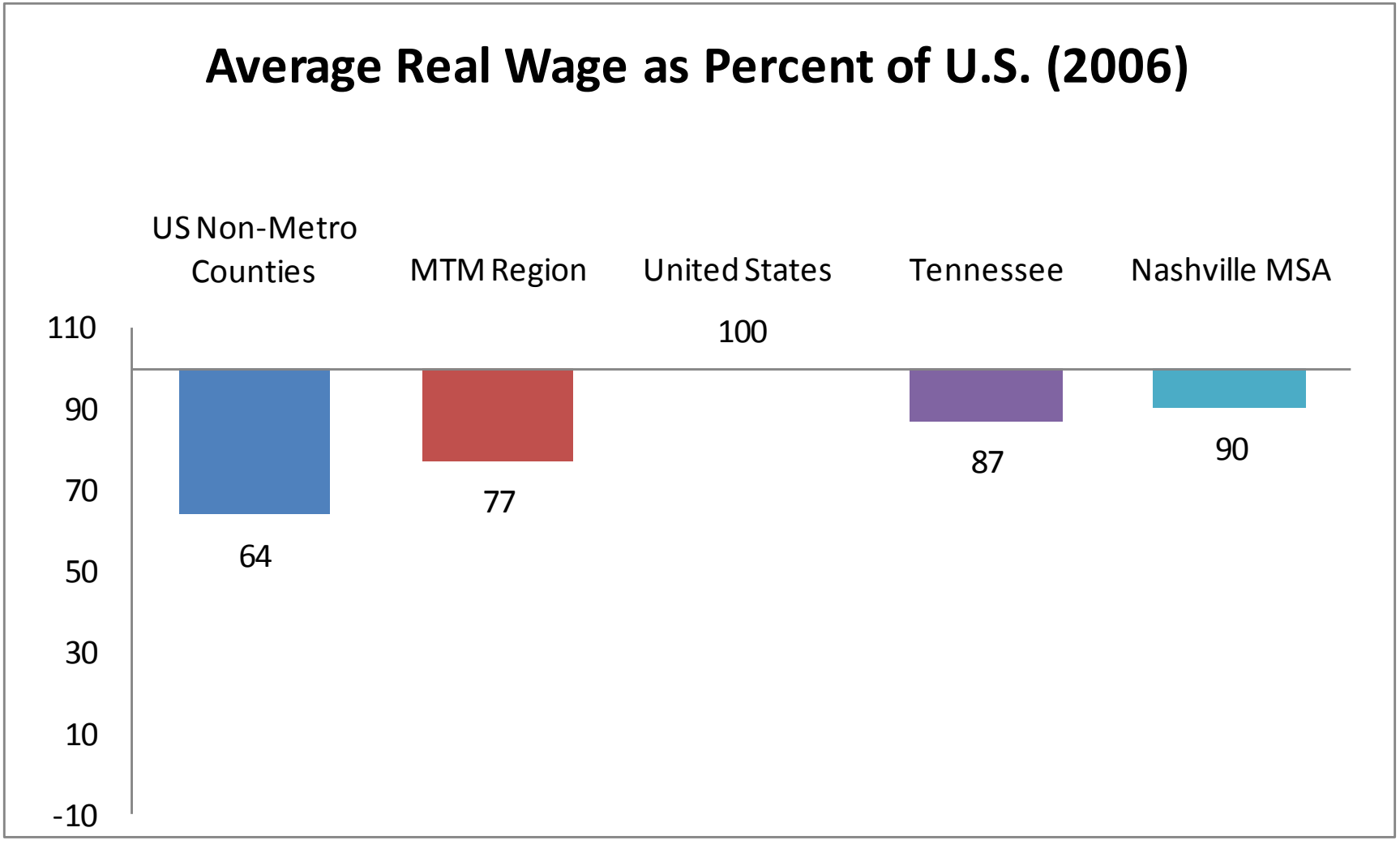
II. Comparative Economic and Demographic Dynamics: Average Wage

- Average wage growth is significant but lags significantly behind U.S., Tennessee, and Nashville MSA



II. Comparative Economic and Demographic Dynamics: Average Wage

- Average wage is 23 percent less than the U.S. average



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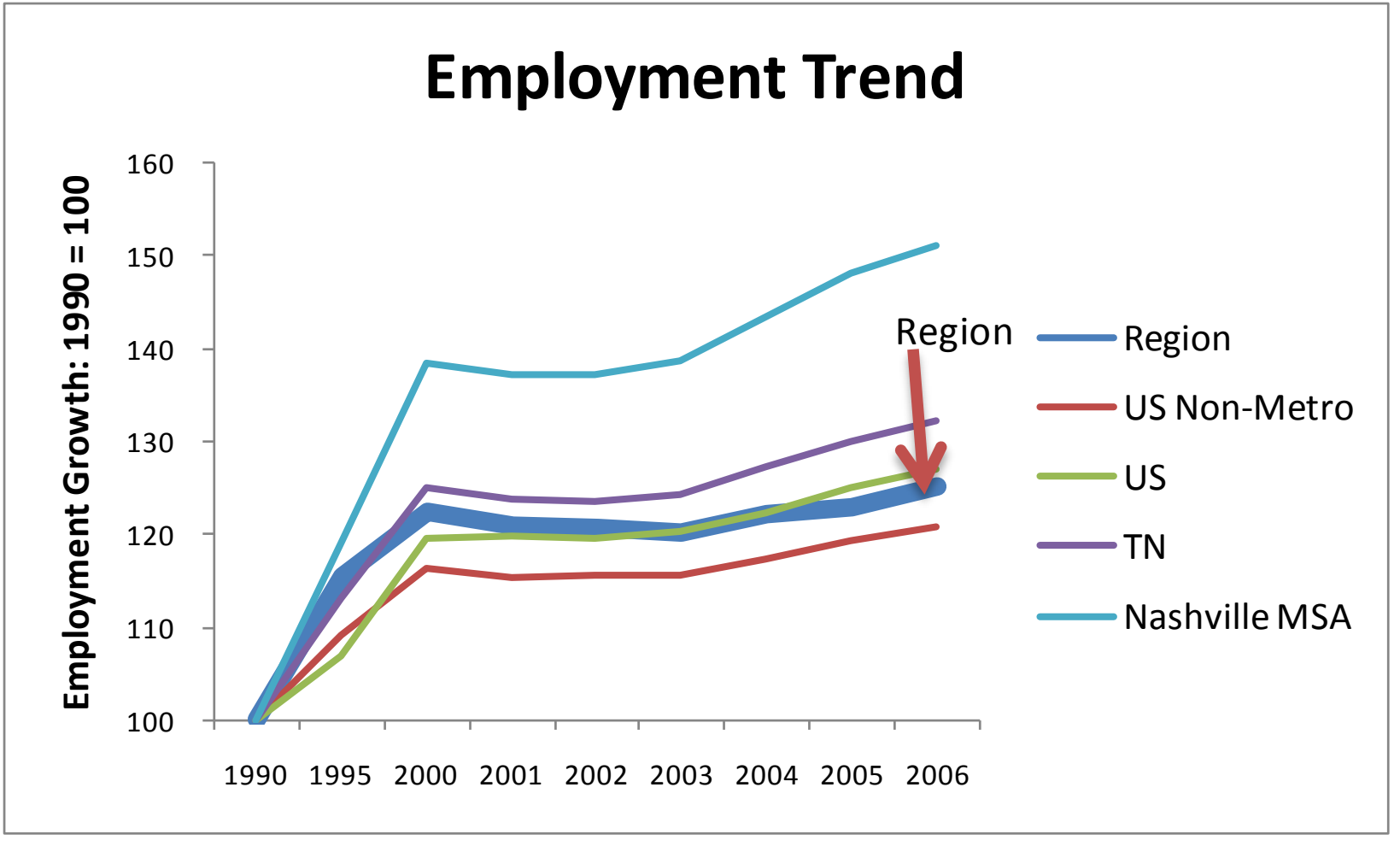
III. Regional Socioeconomic Dynamics: Employment Growth

- Close to United States average, lags Nashville MSA and State
- Manufacturing sector shedding jobs
- Manufacturing is still the key employer

Source: Woods & Poole, Economics, BLS, BEA & BERC Estimates

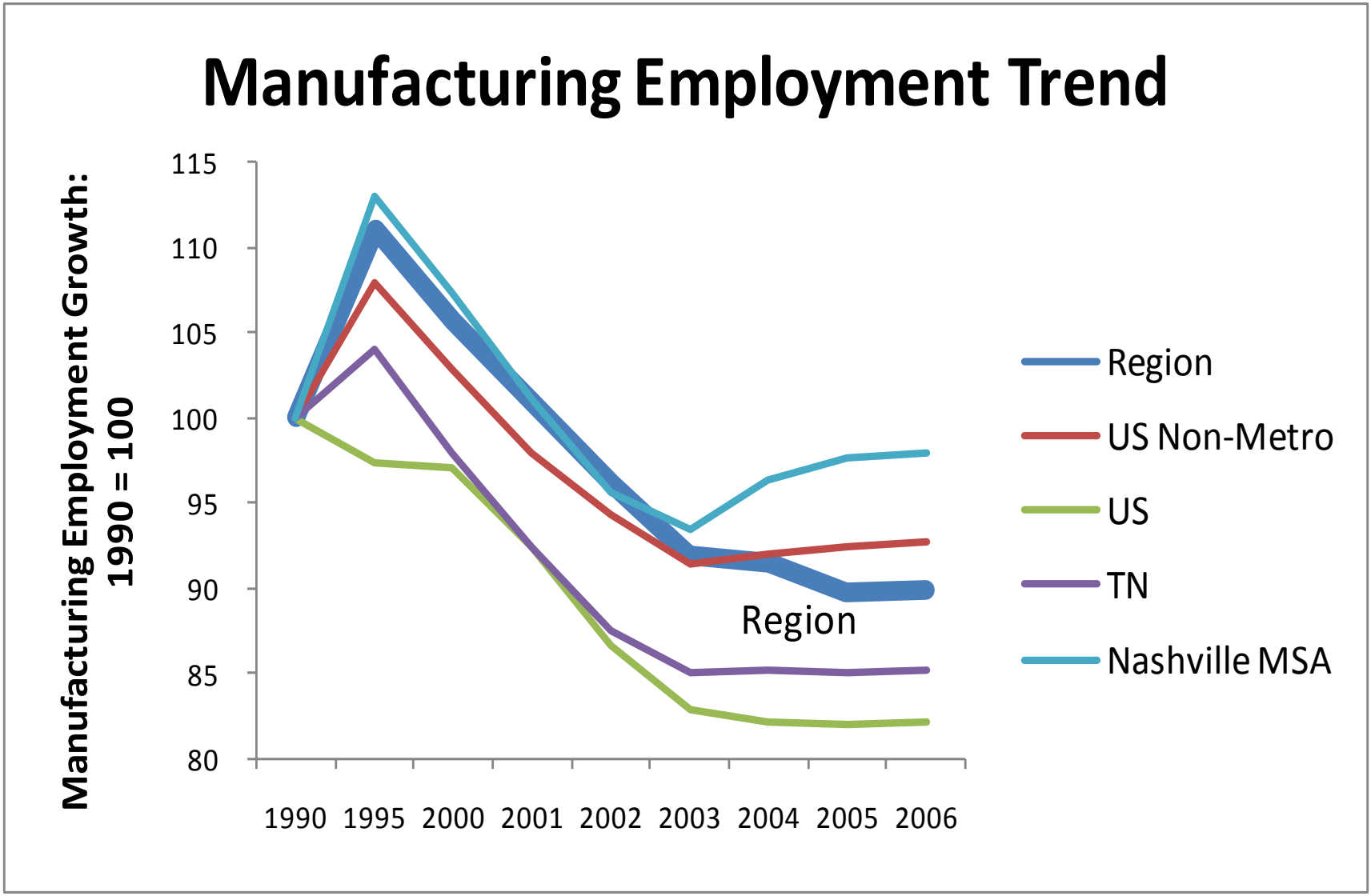
III. Regional Socioeconomic Dynamics: Total Employment

- Region's employment growth is closer to the U.S. average but significantly lags Nashville MSA and Tennessee



III. Regional Socioeconomic Dynamics: Manufacturing Employment

- Region's manufacturing sector continues to shed jobs



III. Regional Socioeconomic Dynamics: Sectoral Employment

EMPLOYMENT BY SECTOR

- Manufacturing sector dominates the economic landscape in the region

Employment by Major Industry Groupings (2007 Q1): Middle Tennessee Marketing Region (MTM)

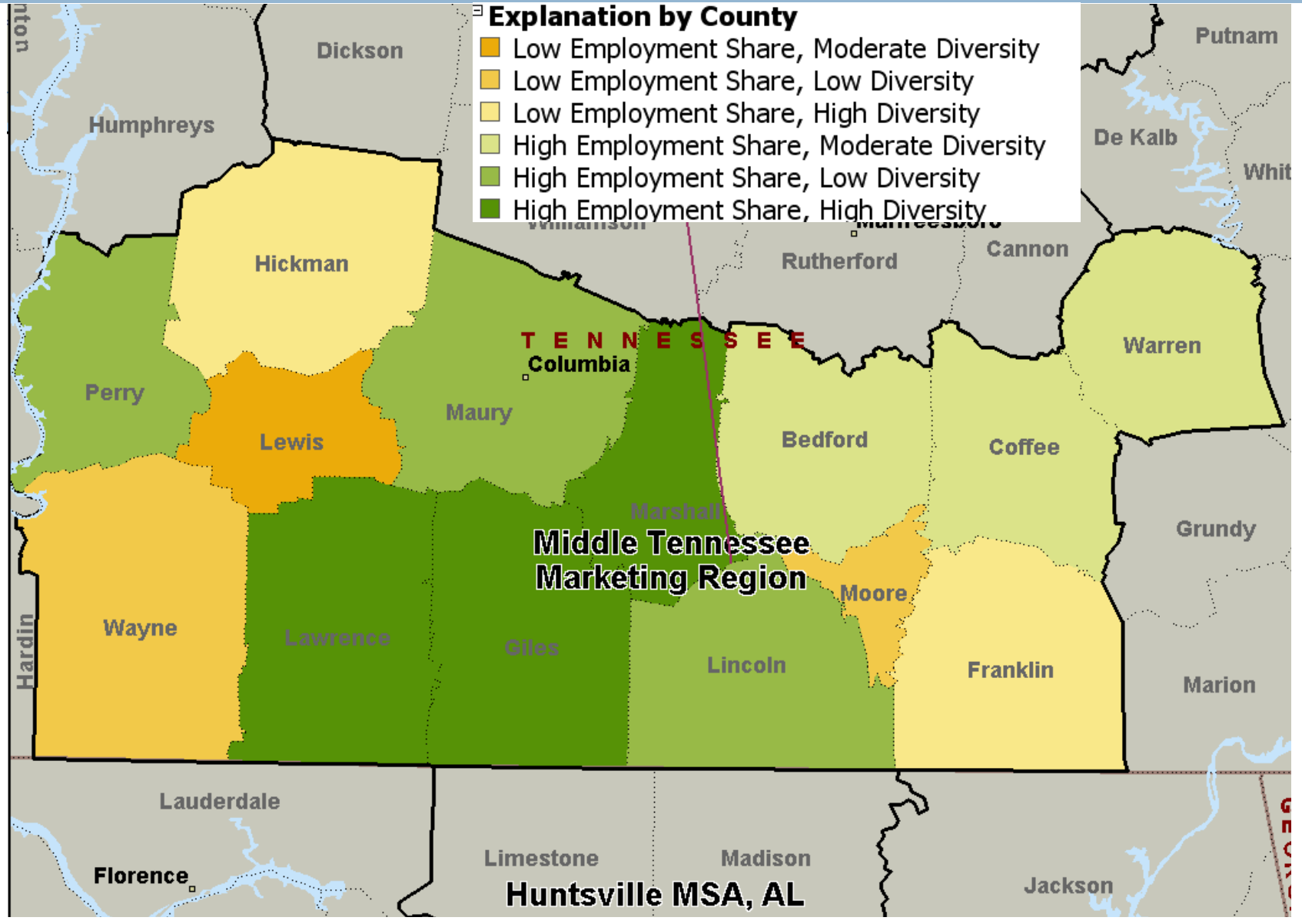
	Employment	Share (%)
Agriculture, Mining, Construction and Utilities	9,479	5.98
Manufacturing	**41,342**	**26.09**
Wholesale and Retail Trade	23,603	14.90
Transportation and Warehousing	4,916	3.10
Enabling Industries*	23,579	14.88
Education and Health Services	**34,760**	**21.94**
Amusement, Hospitality and Other services	14,911	9.41
Grand Total**	158,450	

BERC and ES202 Data

*Includes sectors from business to information services

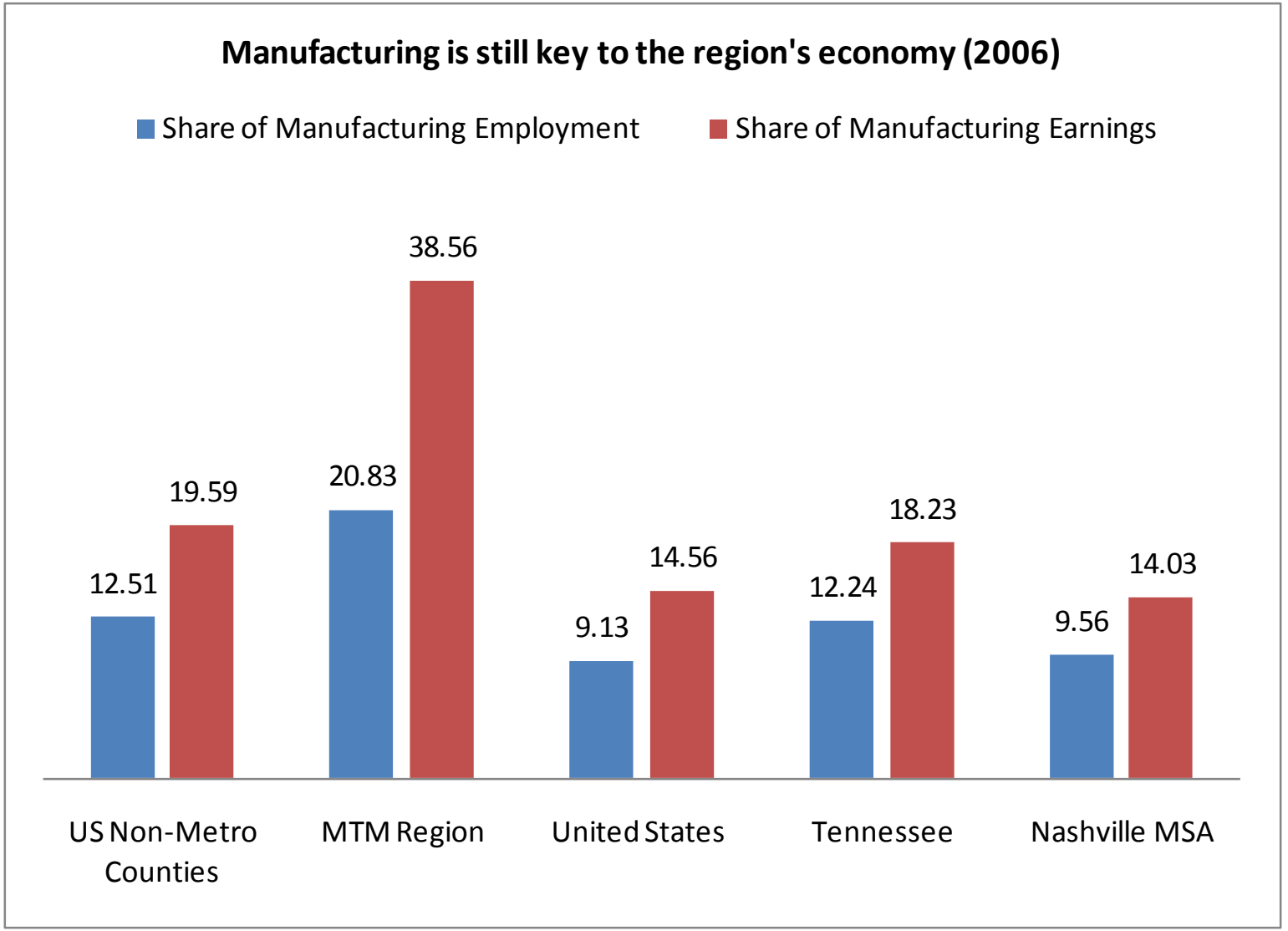
**Public Administration is excluded.

III. Regional Socioeconomic Dynamics: Manufacturing Sector Diversity



III. Regional Socioeconomic Dynamics: Manufacturing Employment

- Manufacturing continues to be key to the region's economy



II. Comparative Economic and Demographic Dynamics: Manufacturing Employment

"We cannot afford to lose our manufacturing capabilities."

A Local Economic Development Official

III. Regional Socioeconomic Dynamics: Economic Diversity

ECONOMIC DIVERSITY

- Economic diversity refers to the even distribution of employment across sectors

"We do not want to put all of our eggs in one basket."

A local economic development official

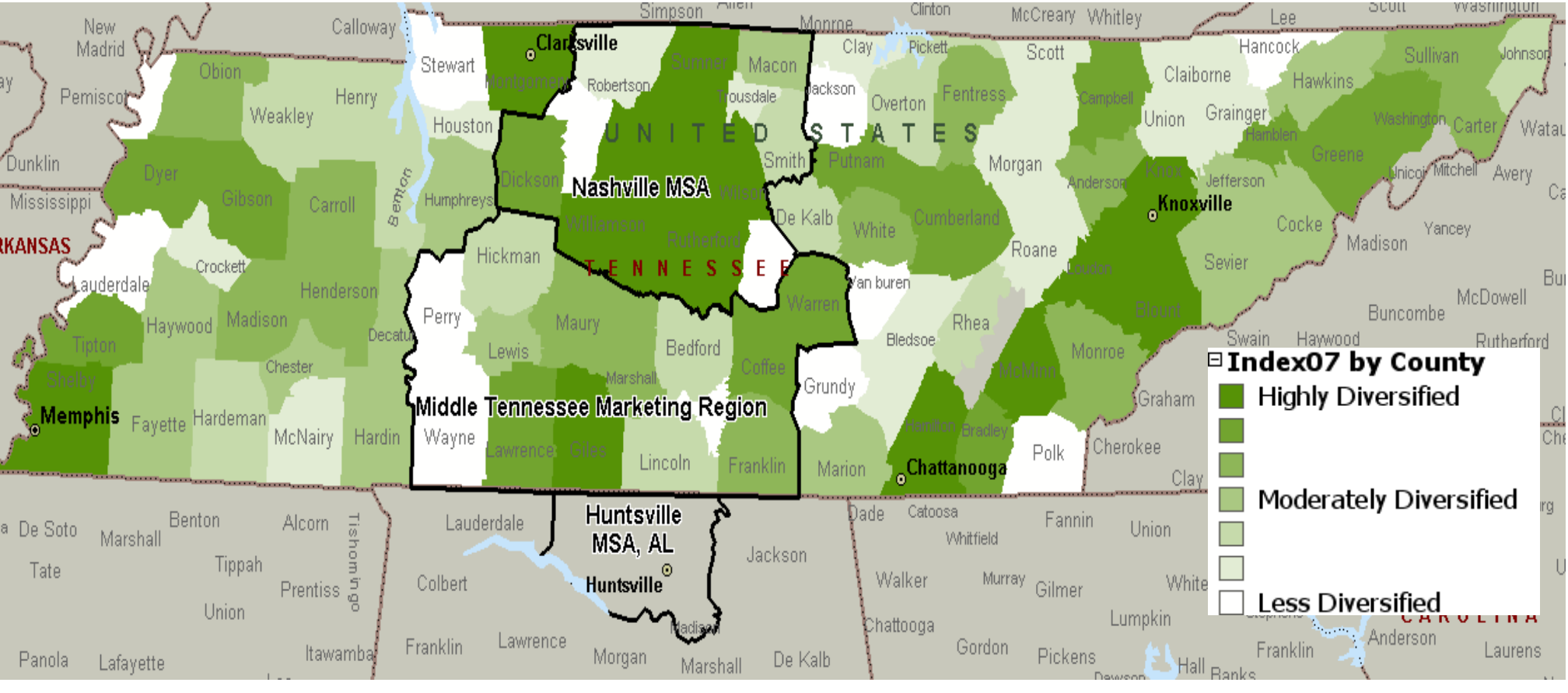
III. Regional Socioeconomic Dynamics: Economic Diversity

- Region has a diverse economy
- Individual counties' diversity varies significantly
- Overall economic diversity increased

Source: ES202 Data & BERC Estimates

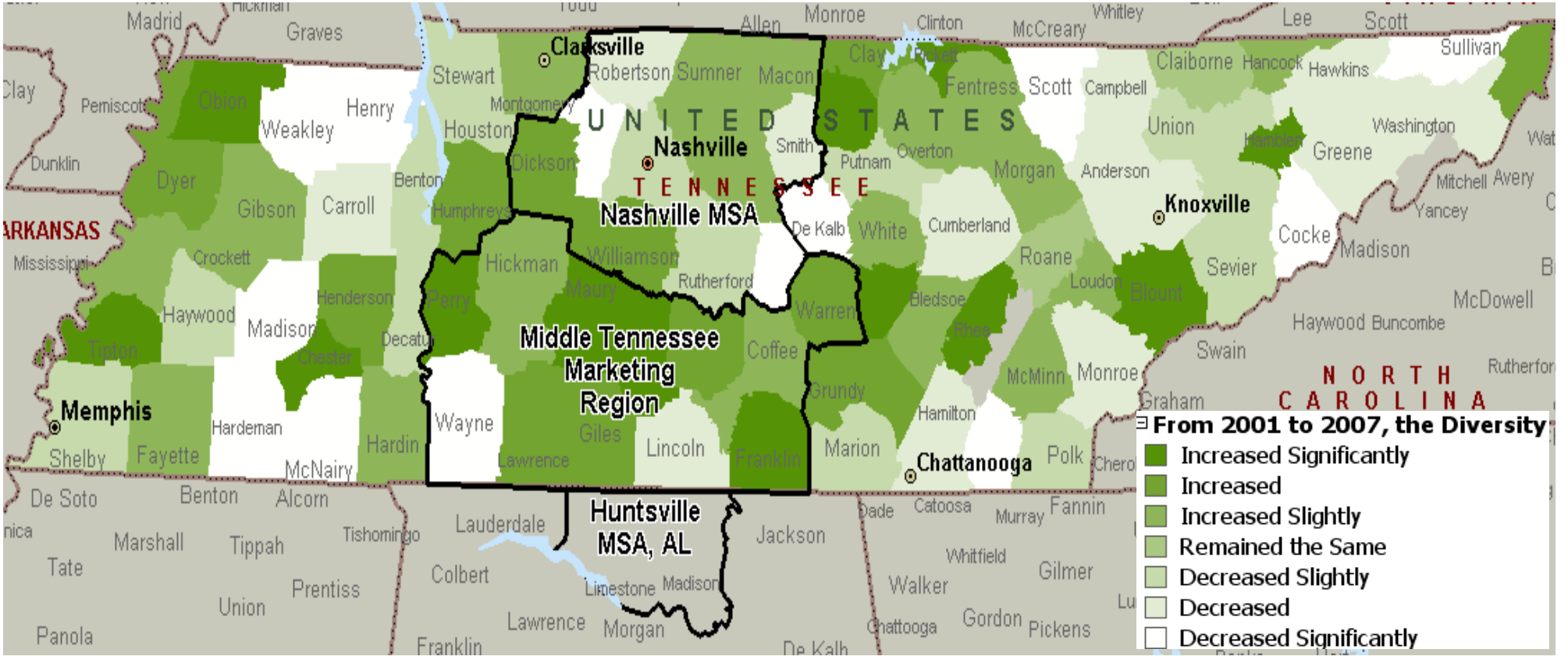
III. Regional Socioeconomic Dynamics: Economic Diversity

- Region as a whole has a diverse economy; however, individual counties' diversity varies significantly



III. Regional Socioeconomic Dynamics: Change in Economic Diversity

- Overall, economic diversity in the region's counties increased significantly



III. Regional Socioeconomic Dynamics: Economic Vitality and Autonomy

- Economic vitality refers to employment share of establishments by employment size

- Autonomy refers to the employment share of branch operations in the region

Data in this section is processed from "www.youreconomy.org"

III. Regional Socioeconomic Dynamics: Economic Vitality and Autonomy

- Over the years, number of branch operations increased but employment share declined
- Government and nonprofits are important part of economic life
- Small businesses are critically important in the region

Regional Economic Vitality and Autonomy

Region				
Establishments	2004-2006 Average		1993-2006 Average	
	Number	Percent (%)	Number	Percent (%)
Government & Nonprofit	2,184	10.9%	1,833	10.3%
Branch Operation	**1,144**	5.7%	**1,049**	5.9%
Local Businesses	16,720	83.4%	14,896	83.8%
By Employment Size				
Start-up (1-9)	14,871	88.9%	13,148	88.3%
Small (10-99)	1,757	10.5%	1,661	11.2%
Medium (100-499)	79	0.5%	76	0.5%
Large (500+)	12	0.1%	9	0.1%

Jobs	2004-2006 Average		1993-2006 Average	
	Number	Percent (%)	Number	Percent (%)
Government & Nonprofit	29,815	15.3%	27,712	14.7%
Branch Operation	**53,285**	27.4%	**60,263**	32.0%
Local Businesses	111,245	57.2%	100,115	53.2%
By Employment Size				
Start-up (1-9)	37,629	33.8%	35,700	35.7%
Small (10-99)	38,966	35.0%	37,028	37.0%
Medium (100-499)	13,895	12.5%	13,450	13.4%
Large (500+)	20,756	18.7%	13,937	13.9%

III. Regional Socioeconomic Dynamics: Economic Vitality and Autonomy

- In terms of establishment, government and nonprofits have the largest share as well as establishments employing fewer than 10 people
- The region also has the largest share of employment of local large establishments (500+)

Regional Economic Vitality and Autonomy
2004-2006 Averages (Percent)

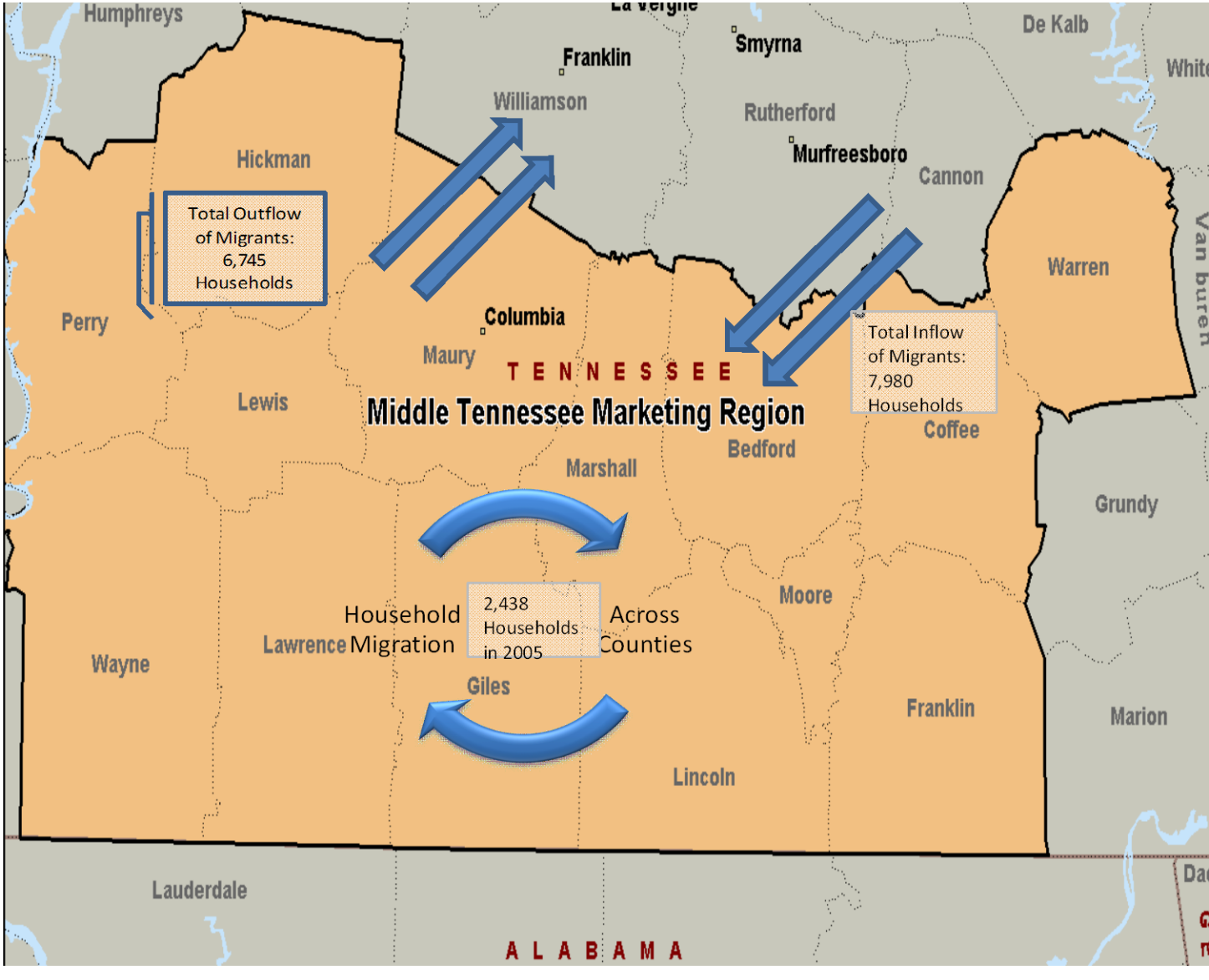
Establishments	Region	TN	US	Nashville MSA	Huntsville MSA
Government & Nonprofit	10.9%	9.3%	7.5%	7.8%	8.5%
Branch Operation	5.7%	7.7%	5.5%	8.4%	8.4%
Local Businesses	83.4%	83.0%	87.0%	83.8%	83.2%
By Employment Size					
Start-up (1-9)	88.9%	87.0%	87.9%	87.2%	87.0%
Small (10-99)	10.5%	12.3%	11.4%	12.0%	12.3%
Medium (100-499)	0.5%	0.7%	0.7%	0.8%	0.6%
Large (500+)	0.1%	0.1%	0.1%	0.1%	0.1%
Jobs					
Government & Nonprofit	15.3%	14.4%	16.2%	15.5%	27.2%
Branch Operation	27.4%	27.4%	20.9%	26.9%	27.5%
Local Businesses	57.2%	58.2%	62.8%	57.6%	45.3%
By Employment Size					
Start-up (1-9)	33.8%	29.7%	30.8%	29.6%	31.6%
Small (10-99)	35.0%	38.1%	37.9%	38.6%	40.2%
Medium (100-499)	12.5%	16.0%	16.4%	17.5%	15.2%
Large (500+)	18.7%	16.2%	14.8%	14.3%	13.0%

III. Regional Socioeconomic Dynamics: Population and Workforce Dynamics

MIGRATION

- In 2005-2006, a total of 2,438 households changed residency from one county to another in the region

Source: IRS County-to-County Migration & BERC Estimates



III. Regional Socioeconomic Dynamics: Population and Workforce Dynamics

MIGRATION

- In 2005-2006, net migration (defined as Inflows-Outflows) to the region was 1,235 households, Maury County representing more than 50 percent

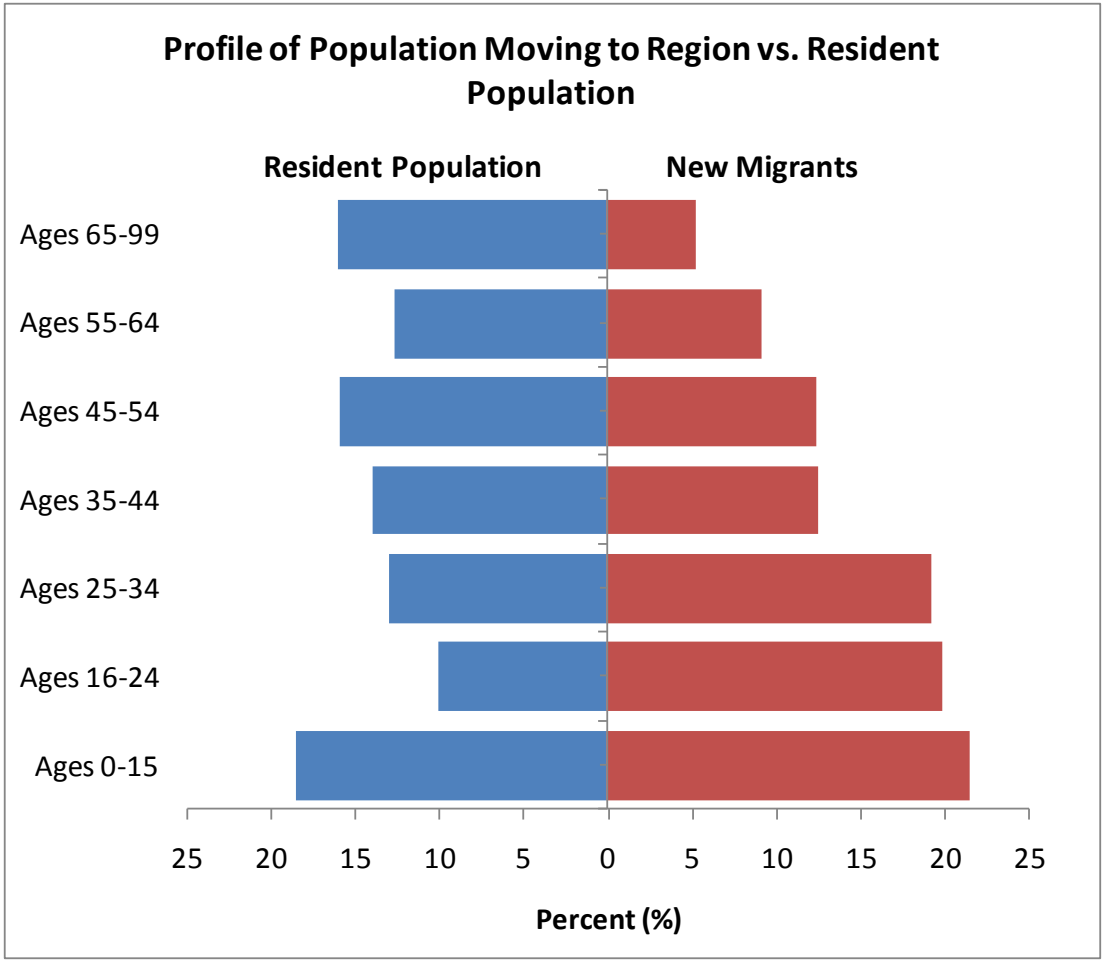
Net Migration (Inflows-Outflows)

Geography	Number of Households
Region	1235
Counties	
Bedford	191
Coffee	222
Franklin	63
Giles	18
Hickman	10
Lawrence	-73
Lewis	39
Lincoln	80
Marshall	122
Maury	551
Moore	-8
Perry	0
Warren	14
Wayne	6

III. Regional Socioeconomic Dynamics: Population and Workforce Dynamics

MIGRATION

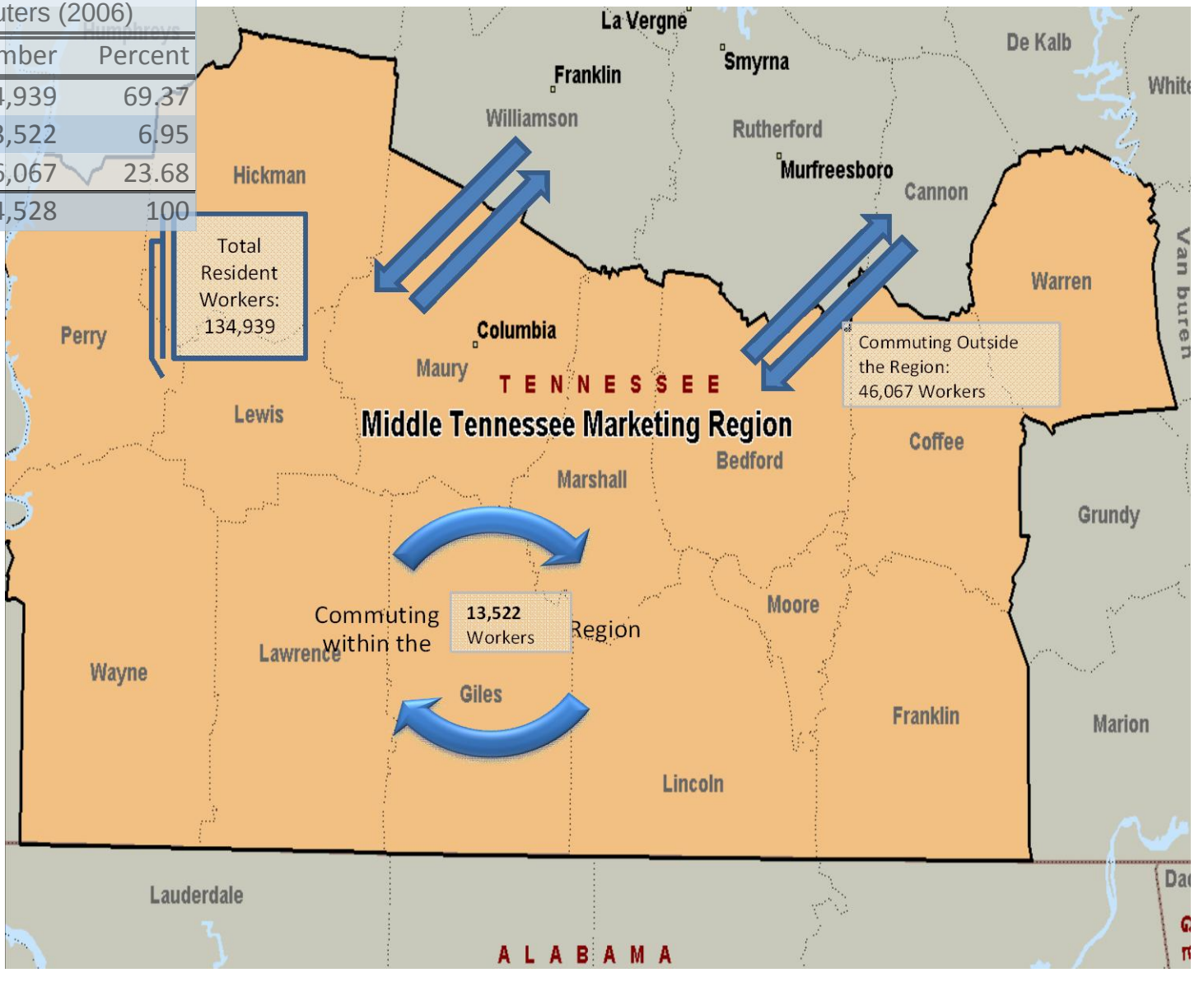
•Compared to the resident population (non-movers) in 2006, new migrants are relatively young



III. Regional Socioeconomic Dynamics: Population and Workforce Dynamics

COMMUTERS

One-Third of Workers are Commuters (2006)		
Type of Workers	Number	Percent
Resident Workers	134,939	69.37
Commuting within the region	13,522	6.95
Commuting outside the region	46,067	23.68
Total	194,528	100



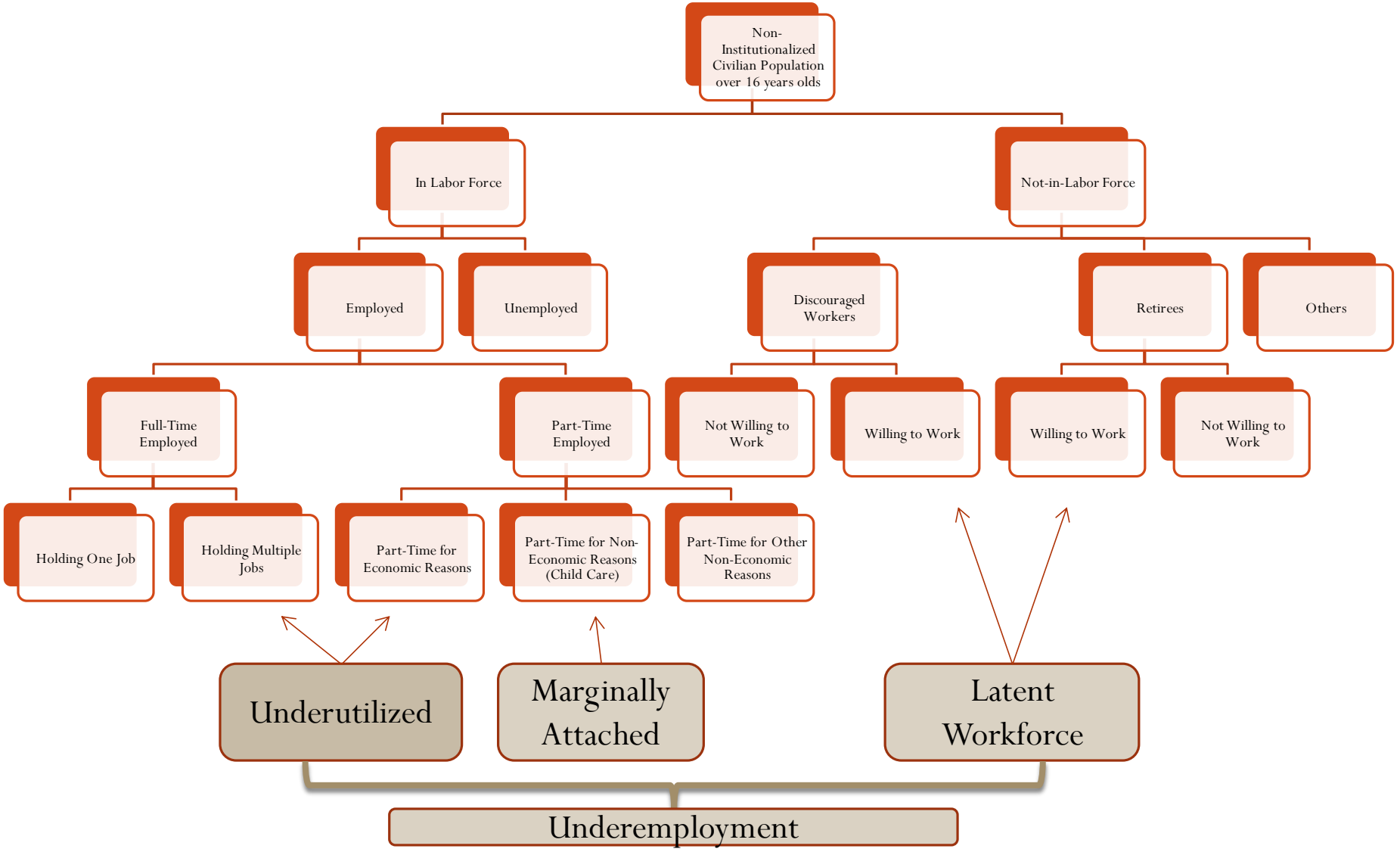
Source: American Community Survey (%5 PUMS) & BERC Estimates

III. Regional Socioeconomic Dynamics: Workforce Dynamics

- Workforce availability
- Aging workforce
- Workforce education

III. Regional Socioeconomic Dynamics: Concept of Underemployment

WORKFORCE AVAILABILITY



III. Regional Socioeconomic Dynamics: Available Workforce

- Available labor force: unemployed + underemployed
- More than 16 percent (34,200+) of labor force

Available Labor Pool in Middle Tennessee Marketing Region (MTM): Employment, Unemployment, and Underemployment**

Counties	Labor Force	Employed	Unemployed	Underemployed	Unemployment Rate	Underemployment Rate
Bedford	22,114	20,970	1,144	2,099	5.2	9.49
Coffee	25,478	24,086	1,392	3,349	5.5	13.15
Franklin	20,087	18,942	1,145	1,088	5.7	5.42
Giles	13,471	12,513	958	1,303	7.1	9.67
Hickman	10,415	9,860	555	0	5.3	0.00
Lawrence	16,899	14,990	1,909	902	11.3	5.34
Lewis	5,244	4,869	375	178	7.2	3.40
Lincoln	17,047	16,331	716	1,346	4.2	7.90
Marshall	12,649	11,854	795	1,729	6.3	13.67
Maury	36,422	34,451	1,971	5,920	5.4	16.25
Moore	3,125	2,978	147	20	4.7	0.64
Perry	3,350	3,131	219	86	6.5	2.58
Warren	18,031	16,405	1,626	1,955	9	10.84
Wayne	6,539	5,857	682	599	10.4	9.16
MTM Region	210,871	197,237	13,634	20,575	6.47	9.76

BERC and Current Population Survey. Statewide underemployment calculations are from October 2007

**Imputed from state level indicators using Ordinary Least Square (OLS) regression analysis (see appendix for technical details)

***All indicators for counties are for 2006

III. Regional Socioeconomic Dynamics: Available Workforce

- These estimates of underemployment, however, are very conservative given the fact survey-based estimates of underemployment in neighboring AL counties put underemployment over 20 percent

- For example, a survey-based study done in 2005 by University of Alabama puts underemployment
  - 19.0 percent in Lauderdale County, AL
  - 27.3 percent in Limestone County, AL
  - 27.1 percent in Madison County, AL
  - 17.5 percent in Jackson County, AL

Source: www2.dir.state.al.us/workforcedev

III. Regional Socioeconomic Dynamics: Aging Workforce

- MTM Region has significant number of available workforce as indicated by unemployment and underemployment numbers.

- However, demand for skilled workforce is likely to increase significantly over the years as the retirement age population (ages 65-99) represents significant share of employment in certain occupations.

- The following table provides a detailed view of employment by occupation and age cohort in the MTM Region.

III. Regional Socioeconomic Dynamics: Aging Workforce

AGING WORKFORCE

- Demand for skilled labor is likely to increase in the near future
- Ages 65-99 have a significant share in the following occupations: scientists and technicians, legal services, entertainment, protective service workers

Source: American Community Survey & BERC Estimates

Employment by Occupation and Age Cohorts (%) (Region-2006)

	Between 16 and 24	Between 25 and 34	Between 35 and 44	Between 45 and 54	Between 55 and 64	Between 65 and 99
Managerial Positions	4.49	17.21	27.57	28.02	**17.44**	**5.27**
Business Services Positions	5.79	20.36	27.06	29.59	**17.19**	**0.00**
Financial Services Positions	12.22	12.18	33.33	24.48	14.38	**3.41**
Computer Programmers and Database Administrators	0.00	19.31	46.04	15.44	**19.22**	**0.00**
Engineering	7.44	28.47	17.99	27.58	12.42	**6.10**
Scientists and Technicians	0.00	12.18	9.89	28.94	**31.04**	**17.95**
Community Services	5.94	17.11	42.39	17.79	11.20	**5.57**
Legal Services Occupations	0.00	17.77	27.55	4.39	**38.42**	**11.87**
Education	8.54	17.82	24.16	25.67	**17.89**	**5.92**
Entertainment	5.34	11.46	25.97	16.02	14.13	**27.09**
Medical	5.53	25.19	31.40	25.25	11.59	**1.03**
Health Services	24.68	20.15	19.83	24.56	8.24	**2.54**
Protective Service Workers	13.53	18.73	12.00	24.26	12.22	**19.24**
Eating and Drinking	48.97	19.91	9.50	10.42	8.63	**2.56**
Cleaning Services	15.50	14.46	24.06	18.51	**18.63**	**8.83**
Personal Services	16.54	20.32	25.02	18.23	11.45	**8.44**
Sales	19.88	20.35	14.37	19.83	**19.02**	**6.56**
Office Workers	14.27	22.47	18.32	20.72	16.19	**8.03**
Farming, Fishing and Forestry	32.24	17.57	20.85	8.33	**21.01**	**0.00**
Construction	16.53	32.35	19.19	20.24	10.96	**0.73**
Extraction (Drilling)	0.00	92.75	0.00	0.00	0.00	**7.25**
Maintenance and Repair	11.20	19.27	18.30	33.07	**14.79**	**3.37**
Production Workers	9.31	24.96	19.61	23.56	**17.10**	**5.47**
Transportation	13.37	19.05	27.46	20.57	12.13	**7.41**

III. Regional Socioeconomic Dynamics: Workforce Education

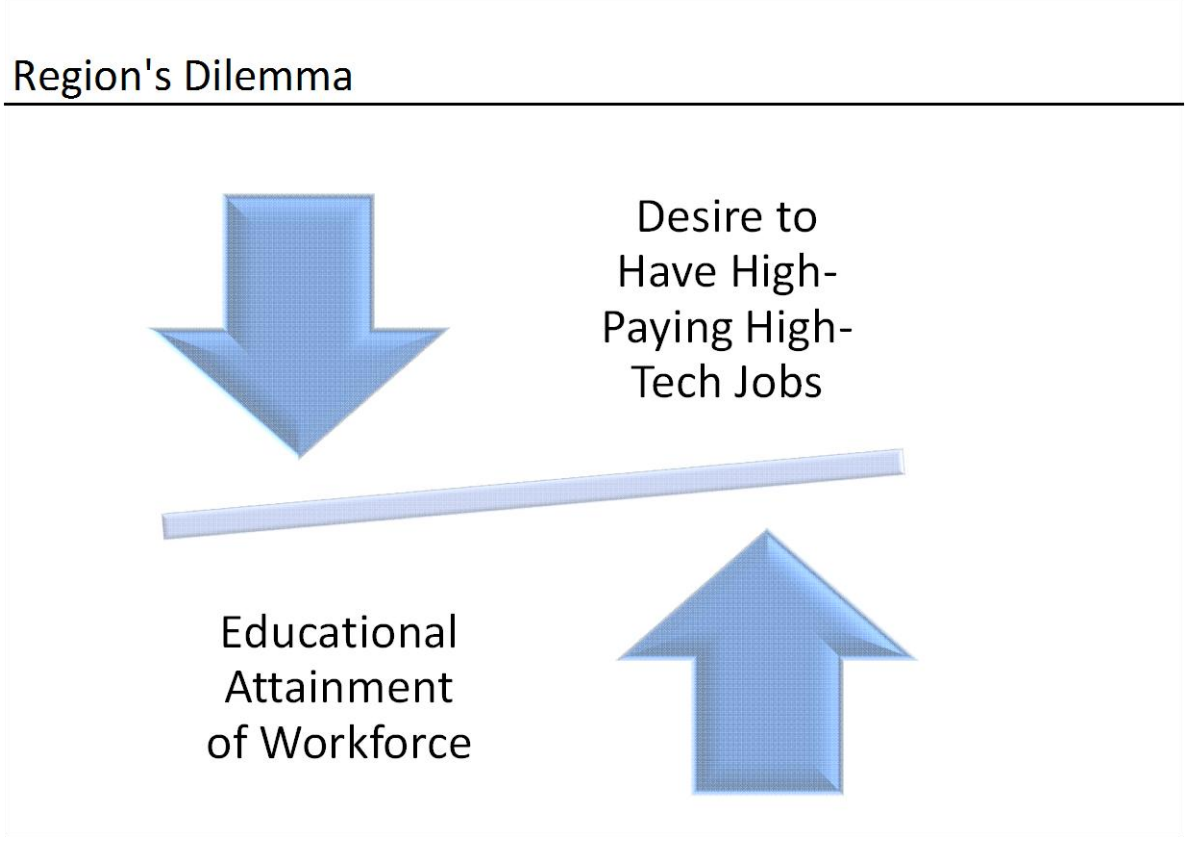
"We would like to bring high-paying high-tech jobs to the region"

Local leaders

III. Regional Socioeconomic Dynamics: Workforce Education

Here is the dilemma

- The less desirable option is to recruit people from out of the MTM Region



III. Regional Socioeconomic Dynamics: Workforce Education

A quick comparison: large gap in postsecondary education categories

Educational Attainment: Then and Now (25 years and over)

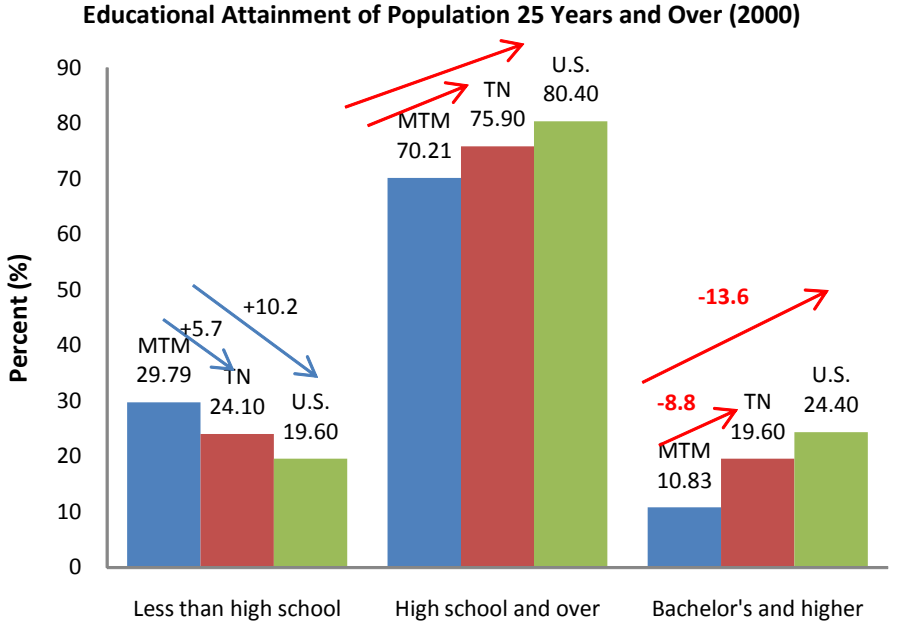
	2000			2006		
Educational Attainment	MTM	TN	U.S.	MTM	TN	U.S.
Less than high school	29.79	24.10	19.60	24.05	19.10	15.90
High school graduate (includes equivalency)	38.21	31.60	28.63	40.68	34.40	30.20
Some college, no degree	16.94	20.00	21.05	16.31	19.20	19.50
Associate degree	4.23	4.70	6.32	5.56	5.70	7.40
Bachelor's degree	6.78	12.80	15.54	8.62	14.10	17.10
Graduate or professional degree	4.04	6.80	8.86	4.78	7.50	9.90
Summary View						
Less than high school	29.79	24.10	19.60	24.05	19.10	15.90
High school and over	70.21	75.90	80.40	75.95	80.90	84.10
Bachelor's and higher	10.83	19.60	24.40	13.40	21.70	27.00

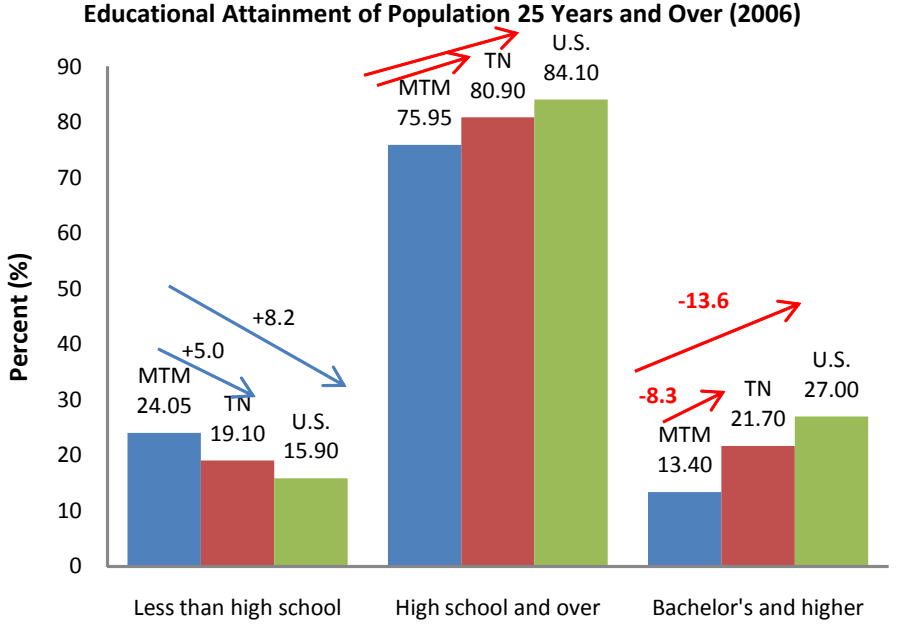
Source: Tabulated from Census 2000 and American Community Survey
MTM refers to Middle Tennessee Marketing Region

III. Regional Socioeconomic Dynamics: Workforce Education

WORKFORCE EDUCATION

A quick comparison: large gap in postsecondary education categories

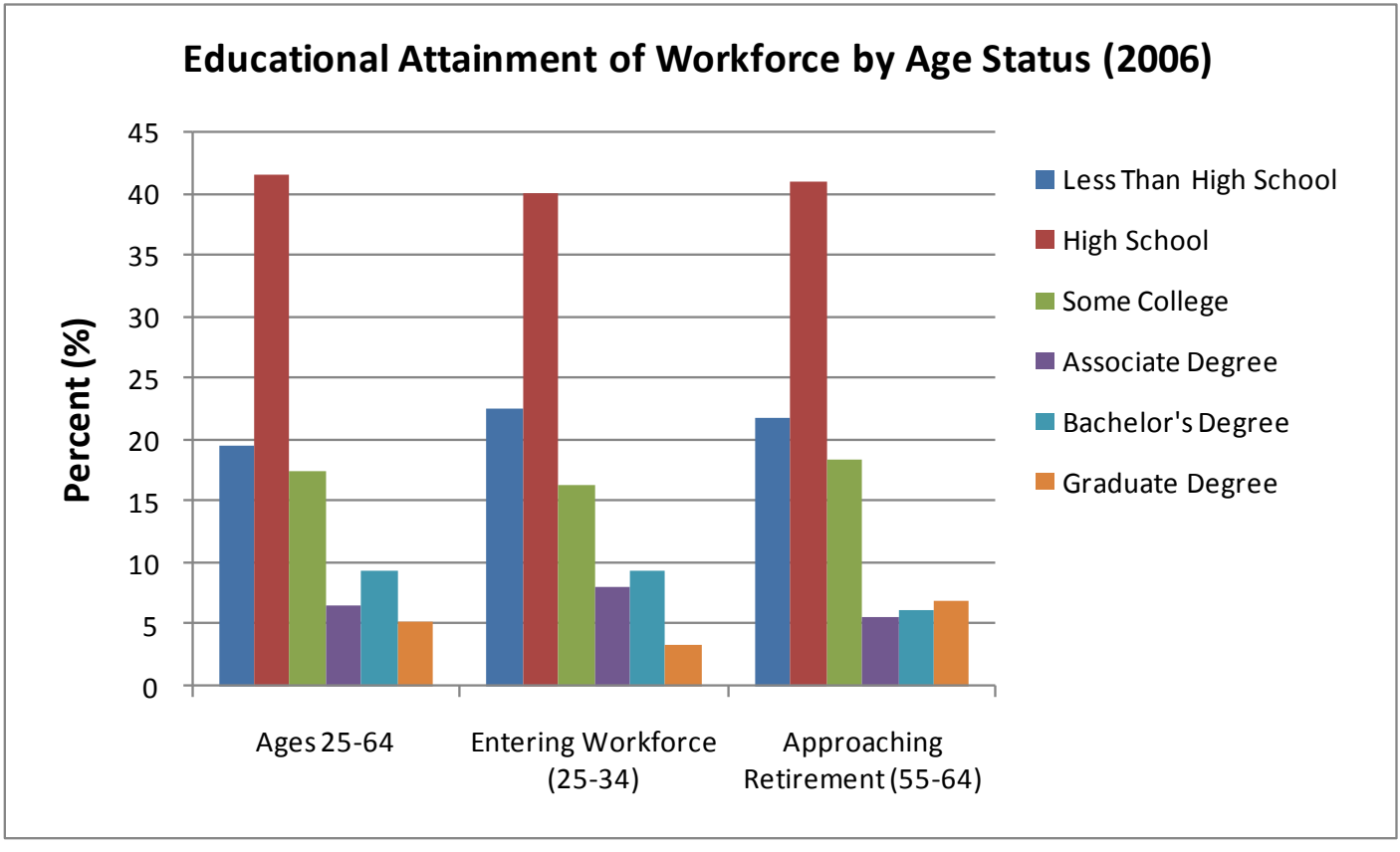




Source: American Community Survey, Census Bureau & BERC Estimates

III. Regional Socioeconomic Dynamics: Workforce Education

•From a different perspective, entering workforce is not better than those approaching retirement age in terms of "less than high school" category.
•In fact, workers approaching retirement age are significantly better off in "graduate degree" category.



Source: American Community Survey & BERC Estimates

III. Regional Socioeconomic Dynamics: Workforce Education

- "Less than high school" category as educational requirement for occupations is no longer part of the official job description (www.bls.gov) for nearly all occupations

- Key to addressing "high-wage" issue is to develop policies to eliminate education gap in the region

III. Regional Socioeconomic Dynamics: Workforce Education

WORKFORCE EDUCATION

- This table requires close scrutiny by local leaders

Source: American Community Survey, BLS, & BERC Estimates

Educational Attainment by Occupation (%) (2006)

	Middle Tennessee Marketing Region					U.S. Average	Region-U.S
Occupations	Less Than High School	High School	Some College	Associate Degree	College and Above	College and Above	GAP in College & Above
Managerial Positions	**6.07**	34.48	19.99	2.89	36.58	60.00	**-23.42**
Business Services Positions	**0.00**	29.48	19.04	16.84	34.64	51.00	**-16.36**
Financial Services Positions	**2.27**	15.20	24.76	12.46	45.32	63.00	**-17.68**
Computer Programmers and Database Administrators	**0.00**	22.21	15.26	15.08	47.45	66.00	**-18.55**
Engineering	**1.12**	14.45	29.52	8.02	46.89	60.00	-13.11
Scientists and Technicians	**0.00**	41.76	17.49	7.51	33.24	79.00	**-45.76**
Community Services	**12.42**	5.64	6.41	7.86	67.67	69.00	-1.33
Legal Services Occupations	**0.00**	27.63	16.33	16.33	39.71	65.00	**-25.29**
Education	**4.72**	18.64	10.19	5.94	60.52	77.00	**-16.48**
Entertainment	**3.64**	25.44	13.93	13.98	43.01	54.00	-10.99
Medical	**0.00**	10.52	14.74	40.77	33.97	58.00	**-24.03**
Health Services	**20.32**	35.34	36.14	4.26	3.94	15.00	-11.06
Protective Service Workers	**7.02**	53.69	22.84	3.49	12.95	23.00	-10.05
Eating and Drinking	**39.33**	42.69	14.24	2.68	1.06	9.00	-7.94
Cleaning Services	**37.90**	46.02	10.10	0.00	5.98	8.00	-2.02
Personal Services	**20.05**	42.31	26.55	7.06	4.03	21.00	**-16.97**
Sales	**16.77**	42.43	24.02	4.52	12.26	37.00	**-24.74**
Office Workers	**6.87**	39.78	31.75	12.43	9.18	18.00	-8.82
Farming, Fishing and Forestry	**59.00**	22.62	18.38	0.00	0.00	7.00	-7.00
Construction	**31.33**	56.82	9.03	0.99	1.82	4.00	-2.18
Extraction (Drilling)	**51.21**	48.79	0.00	0.00	0.00	3.00	-3.00
Maintenance and Repair	**16.57**	50.80	23.10	6.77	2.76	9.00	-6.24
Production Workers	**23.68**	54.98	15.21	2.50	3.63	7.00	-3.37
Transportation	**30.88**	55.16	11.55	1.18	1.22	12.00	-10.78

Presentation Outline

I. Regional Overview

II. Comparative Economic and Demographic Dynamics

III. Regional Socio-Economic Dynamics

IV. Regional Strengths and Weaknesses (Highlights from Business Surveys and Interviews)

V. Industry Clusters: An Overview

VI. Target Clusters

VII. Recommendations and Conclusion

IV. MTM Business Survey: S.W.O.T. Analysis

- For Local Businesses
  - Regional strengths and weaknesses
    - (Strengths) Logistics/Location, Location, Location…
    - (Weaknesses) Labor, Labor, Labor…
  - Global opportunities and threats
    - (Opportunities) Export, Location…
    - (Threats) Fuel Cost, Overseas Competition…

IV. MTM Business Survey: S.W.O.T. Analysis

- For Supplier Industries of Local Businesses
  - Regional strengths and weaknesses
    - (Strengths) Highway Access
    - (Weaknesses) Fewer Regional Resources
  - Global opportunities and threats
    - (Opportunities) Innovation
    - (Threats) Low Cost Labor Overseas
- For Customer Industries of Local Businesses
  - Regional strengths and weaknesses
    - (Strengths) Consistent Demand
    - (Weaknesses) Regulations/Compliance Cost
  - Global opportunities and threats
    - (Opportunities) Globalization/Rationalization
    - (Threats) Alternative Energy/Steel Supply

IV. MTM Business Survey: S.W.O.T. Analysis

S.W.O.T. ANALYSIS

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS: S.W.O.T ANALYSIS FOR REGIONAL CLUSTERS, THEIR SUPPLIER AND CUSTOMER INDUSTRIES

S.W.O.T FOR REGIONAL CLUSTERS

REGIONAL STRENGTHS

I. Geographic Location/ Logistics
II. Motivated and Stable Existing Workforce
III. Technology/ Automation
IV. Low Cost labor
V. Highest Quality Business Environment

REGIONAL WEAKNESSES

I. Labor Pool (Basic and Soft Skill)
II. Lack of Skilled Workforce
III. Economy/ Energy-Material Cost
IV. High Cost of Government Compliance
V. Loss of Demand

GLOBAL THREATS

I. Increased Fuel/ Transportation Cost
II. Cheap Labor in Other Countries/ China
III. Overseas Competition
IV. Economy/ Weak Dollar
V. Loss of Jobs to Overseas

GLOBAL OPPORTUNITIES

I. Economy/ Export Opportunities
II. Location/ Local Transportation
III. New/ Increased Customer Base
IV. Technology/ License
V. New Unique Products

S.W.O.T FOR SUPPLIER INDUSTRIES

Local Strengths

I. Access to Highway/ Delivery Time
II. Enlarged Training Programs
III. Excellent Road Network
IV. Proximity
V. Labor Cost

Local Weaknesses

I. Fewer Regional Resources
II. Lack of Funding/ Projects
III. Overseas Competition
IV. Rising Raw Material Costs
V. Uneven Demand

Global Threats

I. Low Cost Labor
II. Steel Supply
III. Oil Prices
IV. Less Compliance Cost
V. Supplier Base

Global Opportunities

I. Innovation
II. Outsourcing Work
III. R&D in the U.S.
IV. Local Transport
V. More Automative Choosing

S.W.O.T FOR CUSTOMER INDUSTRIES

Local Strengths

I. Consistent Demand
II. Local Suppliers
III. Location/ Infrastructure
IV. Low Labor Cost
V. Product Delivery/ Response Time

Local Weaknesses

I. Regulations/ Compliance Cost
II. Location/ Logistics
III. Lack of Steel Supply
IV. Lack of Projects
V. Outdated Equipment

Global Threats

I. Alternative Technology
II. Steel Supply
III. Low Labor Cost
IV. Cheap Overseas Products
V. Loss of Foreign Production

Global Opportunities

I. Globalization/ Rationalization
II. Improved Logistics
III. Increasing Exports
IV. Labor Base
V. Partnering

IV. MTM Business Survey: Factor Conditions and Risk Factors

- Corporate top factors for site selection
- Top local factors important for businesses
- Risk factors to competitive businesses and region

IV. MTM Business Survey: Factor Conditions and Risk Factors

FACTOR CONDITIONS

Local Factors Important for Businesses and Level of Local Preparedness

National Corporate Survey*			Local Business Survey**				
Top 15 Factors Important for Site Slection			Top 15 Factors Important for Businesses			Level of Local Readiness	
Factors	Score (%)***	Rank	Factors	Score (%)***	Rank	Score (%)****	Gap*****
Highway Accessibility	96.9	1	Workforce quality	96.7	1	22.2	**-74.5**
Labor Costs	92.3	2	Cost of transportation	96.6	2	38.4	**-58.2**
Energy Availability and Costs	89.0	3	Labor costs	93.3	3	66.6	***-26.7***
Availability of Skilled Labor	88.7	4	Utility costs	93.1	4	61.5	**-31.6**
Occupancy or Construction Costs	88.2	5	Healthcare	82.8	5	65.4	-17.4
Available Land	85.4	6	Higher education and other training institutions	80.0	6	40.7	**-39.3**
Corporate Tax Rate	83.8	7	Basic infrastructure (water, sewer, solid waste, fire, police)	76.7	7	70.3	-6.4
State & Local Incentives	83.4	8	Availability of capital	76.7	8	51.8	***-24.9***
Environmental Regulations	83.2	9	Proximity to suppliers	76.7	9	55.5	***-21.2***
Tax Exemptions	82.8	10	Property taxes	76.7	10	51.8	***-24.9***
Proximity to Major Markets	82.8	11	Transportation availability	76.6	11	55.5	***-21.1***
Availability of Advanced ICT Services	82.2	12	Broadband access	76.6	12	44.4	**-32.2**
Low Union Profile	80.6	13	K-12 school system	72.4	13	48.1	***-24.3***
Availability of Buildings	79.3	14	Proximity to customers	70.0	14	55.5	-14.5
Right-to-Work State	72.1	15	Support for economic development	66.7	15	55.5	-11.2

*The 22nd Annual Corporate Survey & the 4th Annual Consultants Survey (2007)

**BERC Local Business Survey (2008) for Target Industry Analysis

***Score indicates the sum of the percent of those saying "very important" and "important"

****Score indicates the sum of the percent of those saying “excellent" and "good"

*****Gap is the difference between "local readiness in a given factor" and "importance of that given factor for businesses"

IV. MTM Business Survey: Factor Conditions and Risk Factors

RISK FACTORS

- Risk factors refer to the firm specific and/or regional attitudes/factors affecting "healthy business development"

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VII. Recommendations and Conclusion

V. Industry Clusters: Overview

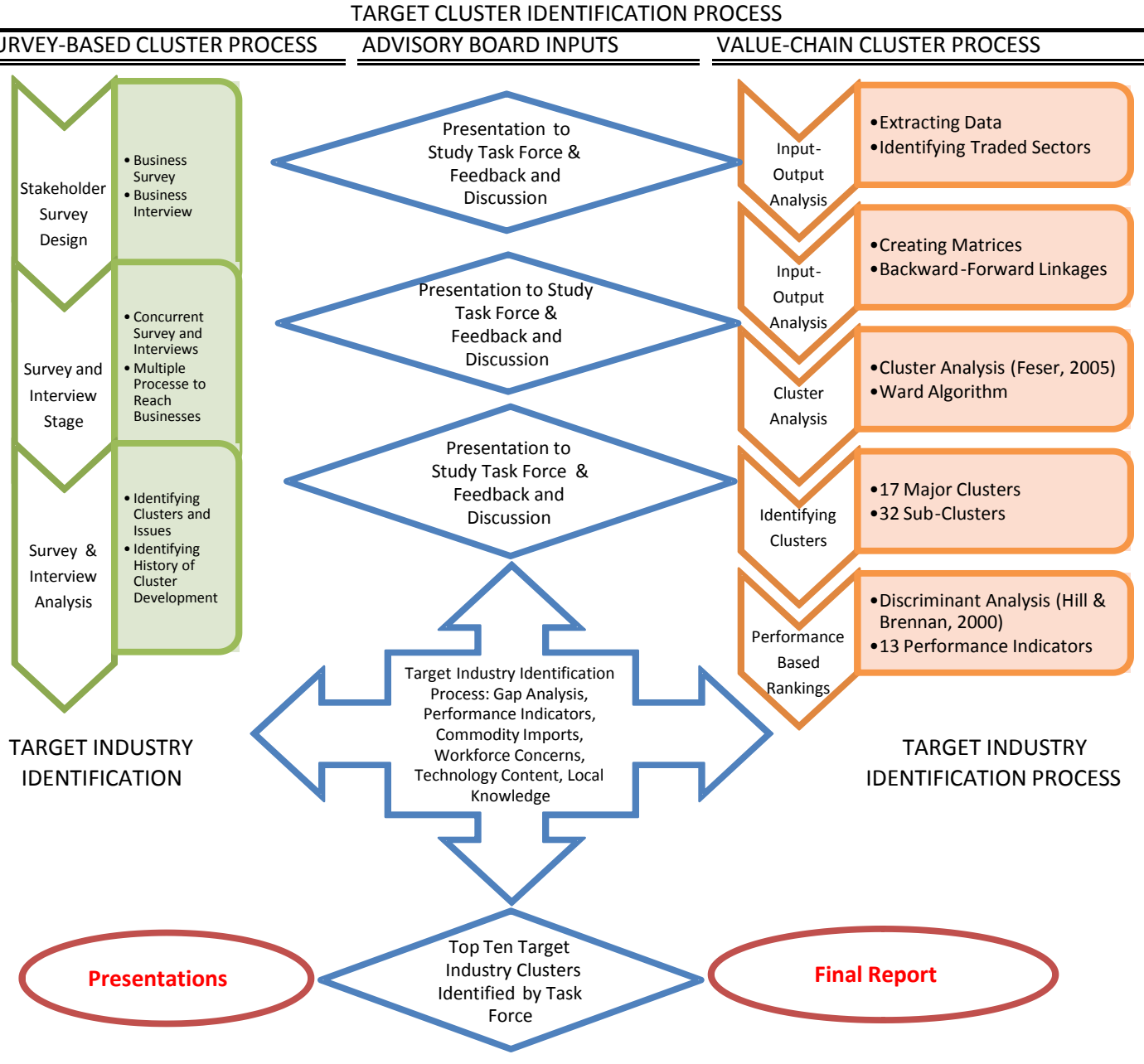
- Business survey and interview overview
- Cluster identification process

V. Industry Clusters: Overview (Surveys and Interviews)

- 30 surveys were returned
- 50 interviews were conducted
- Extensive secondary data analysis was done

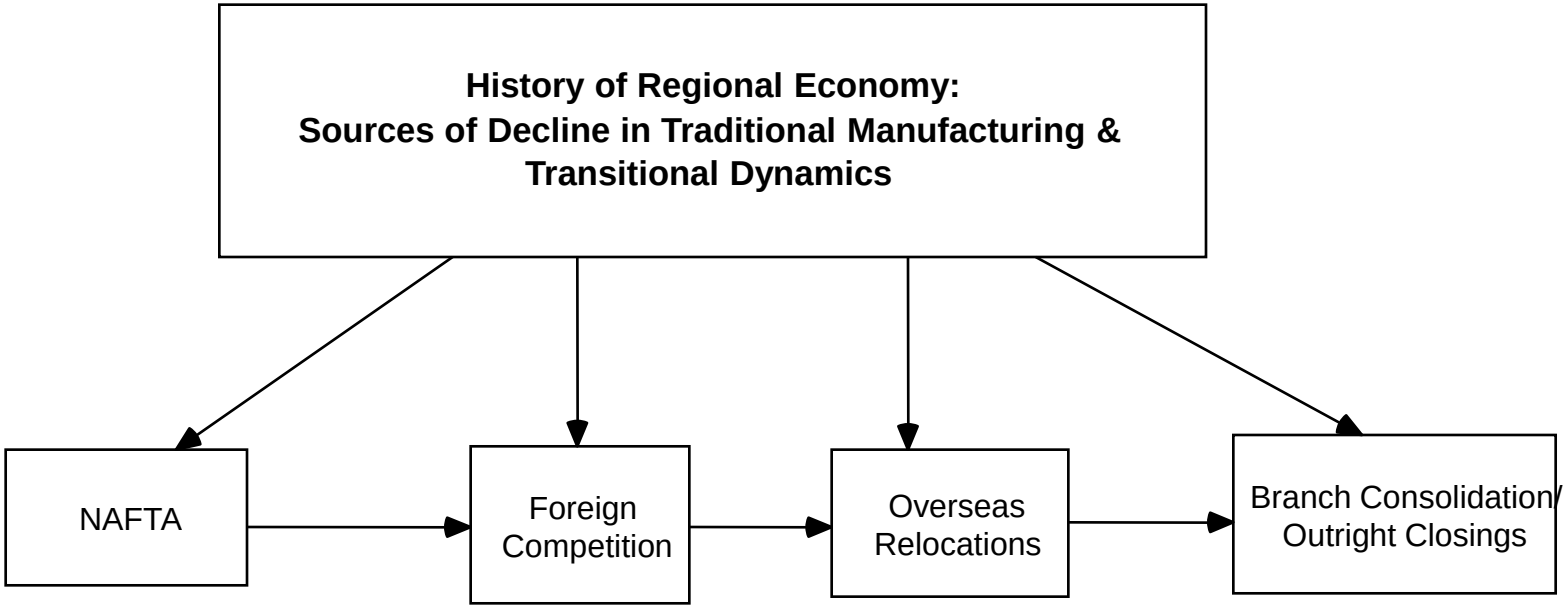
V. Industry Clusters: Overview (Process)

PROCESS



V. Industry Clusters: Overview (Region is in Transition)

REGION IS IN TRANSITION



Transitional Dynamics

Labor Intensive	Technology Intensive
Textile and Apparel	Automative
Heavily Subsidized Low Wage	High-Tech High Paying
Low Skilled Manufacturing	High Skilled Technology
Big Companies	Small and Medium Size
Traditional Manufacturing	Lean Manufacturing
Low Productivity	High Productivity
Single Product Assemply Line	Diversified Product
Branch Operation	Integrated Plant Operation

V. Industry Clusters: Overview (Region is in Transition)

- Critical issue is to manage this transition in a way that
  - Strengthens existing businesses
  - Upgrades workforce skills
  - Addresses small business concerns
  - Upgrades aging infrastructure
    - To create employment and wealth in the region

V. Industry Clusters: Overview (Clusters)

- A successful economic development strategy should focus on the existing industries
  - What are these industries?
  - How should we analyze them?

V. Industry Clusters: Overview (Clusters)

- One way to do that is to group them together using certain communalities
- Cluster concept refers to these communalities among industries
- There is no single way to address the cluster issue
- Some of the common ways are
  - Backward-forward linkages (value chain)
  - Basic (exporting)-non-basic (local)
  - Common labor pool
  - Common technology
  - Common commodity import
  - Performance-based driver industry
- This study utilizes several of these methods to form regional industry clusters and then identify the target clusters

V. Industry Clusters: Overview (Clusters)

- Since this study's primary concern is to develop actionable policies, study team identified
  - broader industry clusters
  - aligned them with the national cluster templates
  - then identified critical issue regarding each cluster
- Some of these issues are
  - What are the gaps in existing clusters?
  - How are these clusters related to technology clusters?
  - What are the commodities these clusters import?
  - What are the major occupations employed by each cluster?

V. Industry Clusters: Overview (Clusters)

- The process of identifying clusters and selecting target clusters was lengthy, nearly 10 months
- Technical processes
  - Initial cluster solution (Feser, 2005)
  - Cleaning and creating sub-clusters to align with national cluster template developed by Feser (2005)
    - Identifying cluster gaps
  - Performing discriminant analysis to rank cluster by performance
  - Linking clusters to technology clusters
  - Identifying commodity imports by cluster
  - Using local input and knowledge to select the target clusters
- In addition, we used surveys to capture aspects of Michael Porter's approach (1990) to competitive cluster strategies (factor conditions, business strategy [risk factors], demand conditions and related and supporting industries)

V. Industry Clusters: Overview (Initial Cluster Rankings): Performance Based Cluster Rankings

INITIAL CLUSTER RANKINGS

- Excluded clusters from the analysis
  - Purely local clusters such as retail trade
  - Federal, state and local governments
- Among 32 sub-clusters, several of them are called "enabling clusters," which are critically important for a healthy business environment
  - 111 Management, Higher Education and Hospitals
  - 101 Hotels and Transportation Services
  - 131 Financial Services and Insurance
  - 61 Business Services
  - 132 Information Services

Source: IMPLANpro & BERC Estimates

Cluster	Cluster name	Rank	Import 2006 (million $)	Export 2006 (million$)
111	Management, Higher Education and Hospitals	1	378	863
13	Motor Vehicles	2	725	6,483
56	Rubber Products	3	391	765
51	Chemical-Based Products	4	52	83
21	Glass Products	5	104	199
92	Packaged Food Products	6	299	708
101	Hotels and Transportation Services	7	330	74
54	Petroleum and Gas	8	519	587
52	Mining	9	23	47
72	Optical Equipment and Instruments	10	146	396
151	Breweries and Distilleries	11	319	821
31	Concrete, Brick Building Products	12	42	84
91	Feed Products	13	159	114
131	Financial Services and Insurance	14	198	136
61	Business Services	15	310	207
132	Information Services	16	117	98
53	Paper	17	273	389
141	Wood Building Products and Processing	18	208	284
171	Farming	19	42	151
161	Printing and Publishing	20	69	97
11	Computer and Electronic Equipment	21	95	109
32	Nondurable Industry Machinery	22	751	1,097
22	Machine Tools	23	151	290
112	Construction	24	73	91
41	Metalworking and Fabricated Metal Products	25	103	188
55	Plastics Products	26	234	281
71	Leather Products	27	33	59
81	Aluminum and Copper Products	28	230	214
121	Arts and Media	29	25	3
73	Textiles and Apparel	30	130	111
74	Wood Product and Furniture	31	6	2
12	Construction Machinery and Distribution Equipment	32	81	59

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VI. Target Clusters

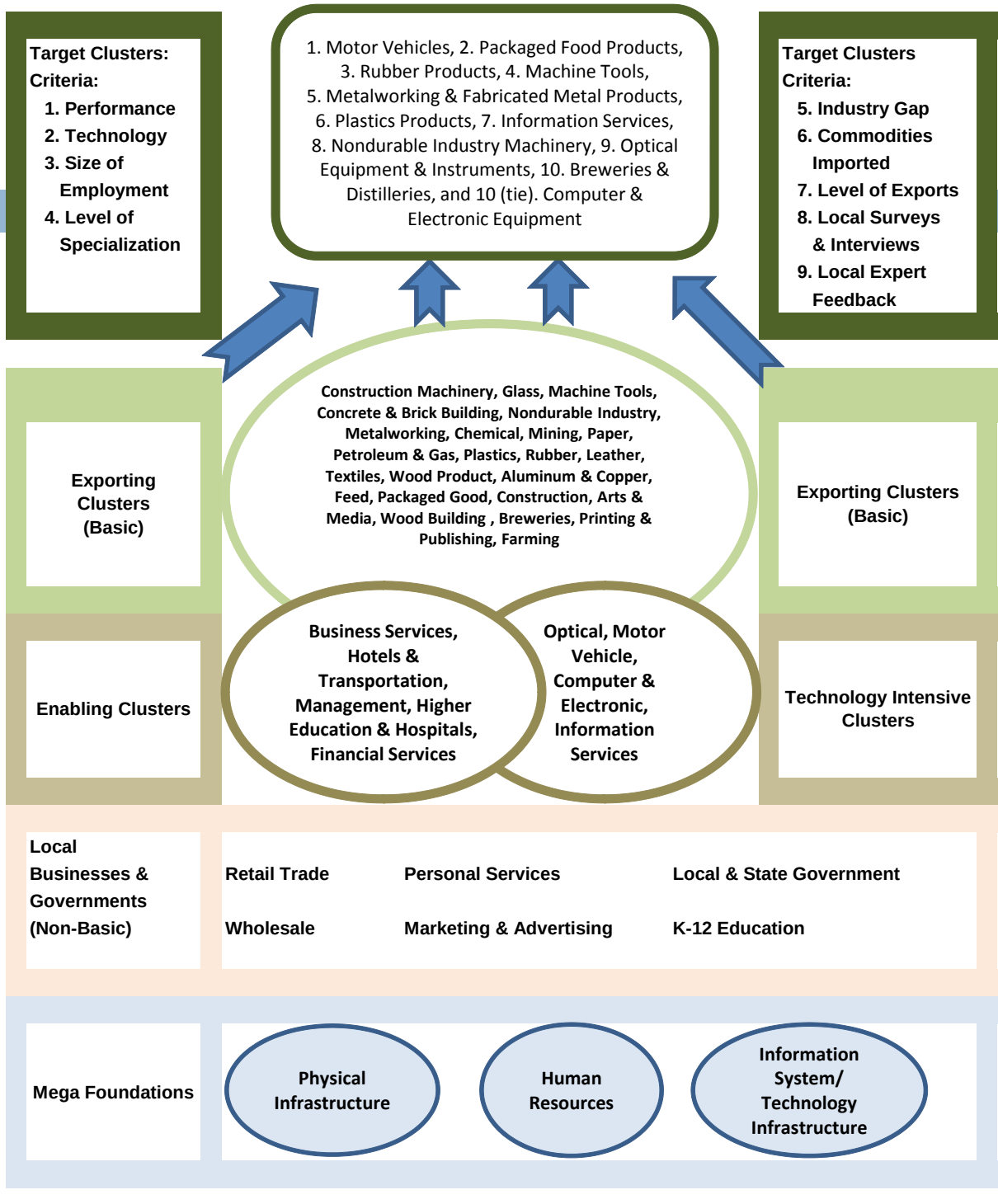
- Selection Process & Inter-Cluster Linkages
- Top 10 Clusters by Selected Performance Indicators
- Target Clusters
- Target Cluster Status

VI. Target Clusters: The Selection Process & Inter-Cluster Linkages

TARGET CLUSTERS

- Selection of target clusters include multiple stages
- In addition to performance indicators, the factors that critically strengthen supply-chain of existing clusters are considered
- Enabling clusters are critical for a healthy business environment
  - They are very much demand-driven

TARGET INDUSTRY SELECTION PROCESS AND INTER-CLUSTER LINKAGES



VI. Target Clusters

TARGET CLUSTERS AND TOP 10 CLUSTERS FOR EACH PERFORMANCE INDICATOR

Cluster Indicators: Employment		Employment		Compensation	Value Added	Productivity	Exports	Imports	Competitiveness		Linkage		Tech	Performance
Cluster	Cluster name	2006	LQ2006	C2006	VA2006	PRO2006	E2006(million $)	2006 (million $)	Industry Mix (IM)	Regional Shift (RS)	Buy	Sell	Share	Rank
11	Computer and Electronic Equipment	800	1.48	$45,456	$49,455	$207,664	109	95	-0.12	0.13	0.60	0.80	97.69	21
12	Construction Machinery and Distribution Equipment	316	1.02	$54,455	$89,292	$403,208	59	81	0.14	-1.04	0.35	0.17	55.89	32
13	Motor Vehicles	10,506	7.69	$89,430	$135,460	$870,985	6,483	725	-0.15	-0.03	32.08	15.55	46.05	2
21	Glass Products	1,457	5.10	$38,958	$77,593	$199,903	199	104	-0.18	0.45	1.40	1.63	0.00	5
22	Machine Tools	2,115	2.05	$48,035	$90,972	$187,103	290	151	-0.04	-0.28	1.00	1.65	6.99	23
31	Concrete, Brick Building Products	411	1.18	$42,019	$85,570	$228,431	84	42	0.04	0.13	0.32	0.01	0.00	12
32	Nondurable Industry Machinery	4,331	4.94	$47,688	$68,107	$284,306	1,097	751	-0.25	-0.20	3.50	1.02	3.88	22
41	Metalworking and Fabricated Metal Products	991	1.36	$38,281	$63,004	$190,537	188	103	-0.04	-0.06	0.44	0.11	21.87	25
51	Chemical-Based Products	271	1.91	$87,714	$172,923	$437,097	83	52	-0.16	0.49	0.38	0.67	100.00	4
52	Mining	378	0.96	$54,076	$112,569	$198,074	47	23	0.09	0.58	0.17	0.45	0.00	9
53	Paper	1,520	3.02	$57,299	$85,804	$306,267	389	273	-0.07	-0.21	1.19	1.20	0.00	17
54	Petroleum and Gas	1,601	0.87	$48,126	$139,357	$582,130	587	519	0.06	0.31	3.59	3.67	0.02	8
55	Plastics Products	1,594	2.30	$45,390	$95,930	$292,389	281	234	-0.11	-0.30	1.51	2.85	5.32	26
56	Rubber Products	3,433	8.23	$52,085	$85,644	$229,201	765	391	-0.16	0.29	1.94	0.20	0.00	3
61	Business Services	15,122	0.58	$32,015	$56,627	$91,546	207	310	0.05	-0.32	4.09	15.75	9.88	15
71	Leather Products	424	3.33	$47,491	$58,097	$180,018	59	33	-0.27	-0.24	0.36	0.14	0.00	27
72	Optical Equipment and Instruments	2,511	7.98	$42,775	$88,791	$180,629	396	146	-0.11	0.06	1.61	0.24	6.17	10
73	Textiles and Apparel	1,239	2.32	$29,565	$52,351	$200,420	111	130	-0.32	-0.15	1.00	0.45	0.00	30
74	Wood Product and Furniture	126	0.71	$39,475	$84,759	$158,376	2	6	-0.15	-0.49	0.06	0.01	0.00	31
81	Aluminum and Copper Products	1,138	2.41	$57,658	$80,632	$354,190	214	230	-0.03	-0.22	1.53	0.30	0.00	28
91	Feed Products	10,517	4.04	$2,825	$9,783	$37,832	114	159	-0.07	0.23	2.57	5.16	0.00	13
92	Packaged Food Products	2,811	2.68	$40,331	$69,443	$326,121	708	299	-0.14	0.04	8.01	1.83	0.00	6
101	Hotels and Transportation Services	12,209	0.61	$18,411	$67,618	$117,816	74	330	0.11	0.24	5.37	15.10	0.00	7
111	Management, Higher Education and Hospitals	14,904	1.43	$36,541	$47,477	$90,981	863	378	0.34	2.41	5.08	3.82	73.88	1
112	Construction	1,939	1.08	$20,978	$41,858	$119,940	91	73	-0.15	0.30	0.86	1.71	14.04	24
121	Arts and Media	488	0.17	$27,483	$39,460	$117,929	3	25	0.01	-0.56	0.24	0.63	0.00	29
131	Financial Services and Insurance	6,489	0.58	$33,092	$84,713	$140,595	136	198	-0.01	0.32	3.10	6.39	0.00	14
132	Information Services	2,533	0.41	$46,336	$87,762	$168,069	98	117	-0.20	0.14	1.64	3.21	53.49	16
141	Wood Building Products and Processing	2,640	2.14	$25,809	$49,682	$185,440	284	208	0.08	-0.11	2.84	2.70	0.00	18
151	Breweries and Distilleries	891	2.43	$68,741	$401,954	$908,002	821	319	0.03	-0.29	2.50	0.27	2.57	11
161	Printing and Publishing	2,522	1.44	$34,315	$45,746	$82,658	97	69	-0.09	0.28	0.45	1.42	0.00	20
171	Farming	9,164	5.19	$3,592	$15,562	$23,346	151	42	-0.23	0.00	0.54	0.83	0.00	19

Legend: **Green Shade:** Target Clusters **Red Font:** Top 10 Clusters for Each Performance Indicator Source: IMPLANpro & BERC Estimates

VI. Target Clusters

Top 10 Clusters for Targeting Purpose & Potential Clusters

Targeted Clusters (Cluster Number)	Original Ranking Based on Performance	New Ranking Based on Local Feedback	Targeted Clusters and Technology Cluster Connections: Aerospace	Architectural and Engineering Services	Chemicals	Computer and Electronic Equipment	Engine Equipment	Information Services	Medical Instruments and Optics	Motor Vehicles	Pharmaceuticals	Precision instruments	Technical and Research Services	Wiring Devices and Switches
Motor vehicles (13)	2	1	Yes				Yes			Yes				
Rubber Products (56)	3	3												
Packaged Food Products (92)	6	2												
Optical Equipment and Instruments (72)	10	9							Yes					
Breweries and Distilleries (151)	11	10 (Tie)									Yes			
Information Services (132)	16	7		Yes				Yes					Yes	
Computer and Electronic Equipment (11)	21	10 (Tie)				Yes			Yes			Yes		
Nondurable Industry Machinery (32)	22	8					Yes					Yes		Yes
Machine Tools (22)	23	4					Yes							
Metalworking & Fab. Metal Products (41)	25	5												
Plastics Products (55)	26	6			Yes						Yes			

Potential/Emerging Clusters: Clusters in this group has close connections with each other.

- Aerospace and Defense
- R&D Based High Tech
- Alternative Energy/Biofuel

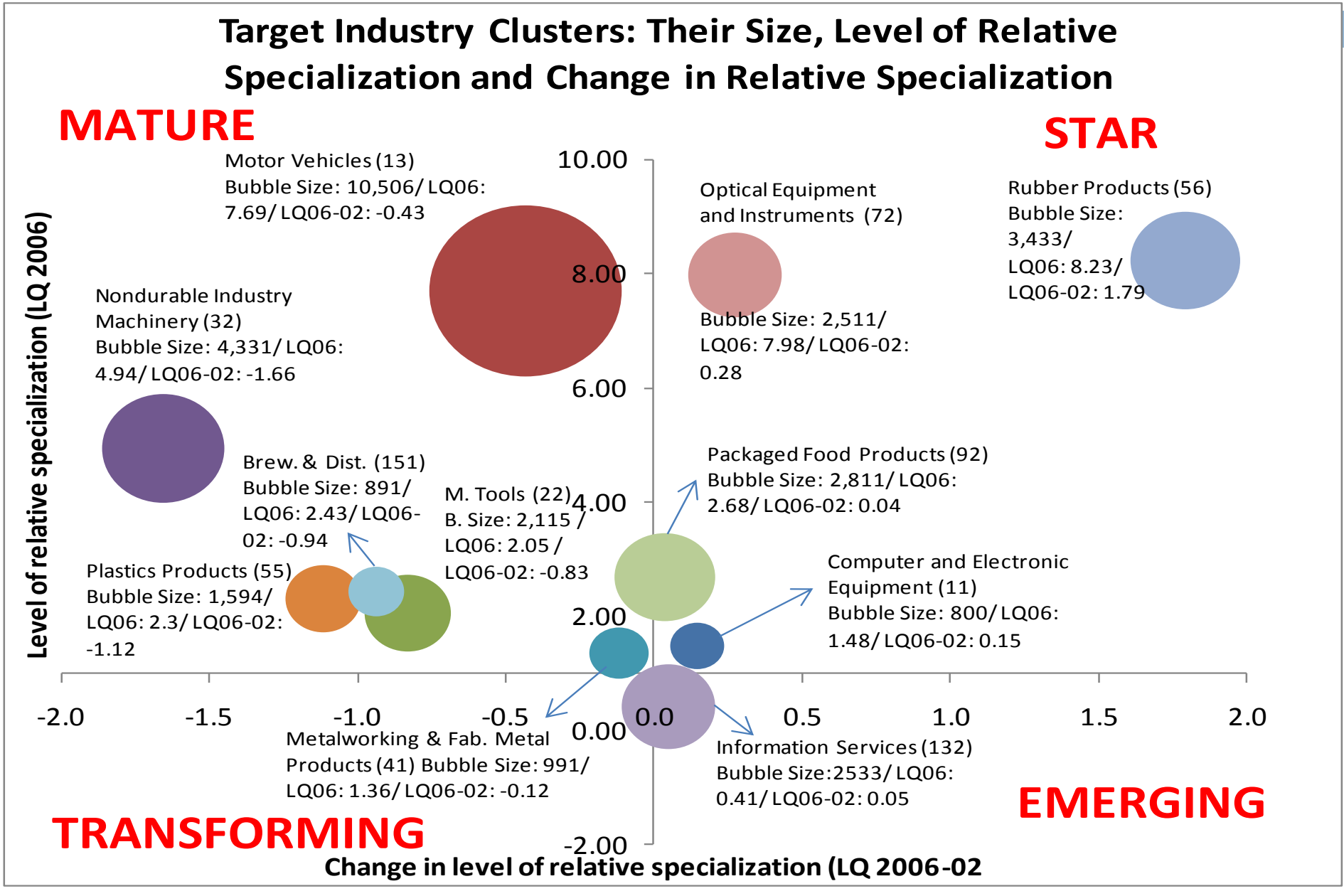
These three research intensive clusters are closely related with each other and other clusters in the region. These clusters require strong enabling clusters in the region, such as, business and financial services and management and higher education. One critical aspect of these clusters is that the region should have strong research centers supported by industry, higher education and government. University of Alabama at Huntsville, UT Space Institute in Coffee County, MTSU in Rutherford County have already established programs that could be expanded for this purpose.

Note 1: New cluster ranking is based on the responses from 10 counties, Middle Tennessee Industrial Board Association (MTIDA) and Business and Economic Research Center at MTSU.

Note 2: Rankings primarily based on cluster performance indicators, cluster gap analysis, cluster-technology connections, cluster imports, and local knowledge.

VI. Target Clusters

TARGET CLUSTERS



Presentation Outline

I. Regional Overview

II. Comparative Economic and Demographic Dynamics

III. Regional Socio-Economic Dynamics

IV. Regional Strengths and Weaknesses (Highlights from Business Surveys and Interviews)

V. Industry Clusters: An Overview

VI. Target Clusters

VII. What is Next? Recommendations and Conclusion

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. Regional Level Workforce Analysis
3. In-Depth Cluster Needs Assessment
4. Emerging Clusters/Areas: High-Tech
5. Emerging Clusters/Areas: Tourism
6. Specific Policy Priorities

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

- Based on communalities of commodities imported and occupations employed, we recommend the following four aggregated clusters to stimulate economic growth:
  - Motor Vehicle and Associated Products Cluster
    - Motor Vehicle Cluster
    - Rubber Products Cluster
    - Plastics Products Cluster
  - Advanced Metal Manufacturing Cluster
    - Machine Tools Cluster
    - Nondurable Industry Machinery
    - Metalworking and Fabricated Metal Products
  - Information Technology and Precision Instrument Manufacturing Cluster
    - Optical Equipment and Instruments Cluster
    - Computer and Electronic Equipment Cluster
    - Information Services
  - Agribusiness Cluster
    - Breweries and Distilleries
    - Packaged Goods Products

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

- Aggregate details for each group of clusters
  - Motor Vehicle and Associated Products Cluster
    - Motor Vehicle Cluster
    - Rubber Products Cluster
    - Plastics Products Cluster

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

Cluster Vital Signs (Cluster Number)

Motor Vehicle and Associated Products (C13, C55, C56)

Data Categories	Indicators	Explanation
Employment (E)		
E2006	15,533	Cluster employment
E Change 2002-06	-7.50%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	6.11	High concentration
LQ2006-2002	-0.45	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$76,656	Compensation per employment
Region's C as % of U.S.	113.14%	Significantly higher than U.S.
Change in C 2006-2002 (%)	14.34%	Positive Growth
Productivity (PRO)		
PRO 2006	$669,760	Productivity
Change in PRO 2006-2002 (%)	48.94%	Strong positive trend
Region's PRO as % of U.S.	161.68%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$7,529	Total Export
EX as % of Output	72.36%	Exports nearly three-fourth of output
EX as % of Region's EX	48.43%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$1,349	Total Imports
Industry Mix Effect on Employment Growth	-14%	A relatively slow growing cluster
Regional Effect on Employment Growth	-2%	Slightly negative locational advantage
Technology Sectors (%)	31.69%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

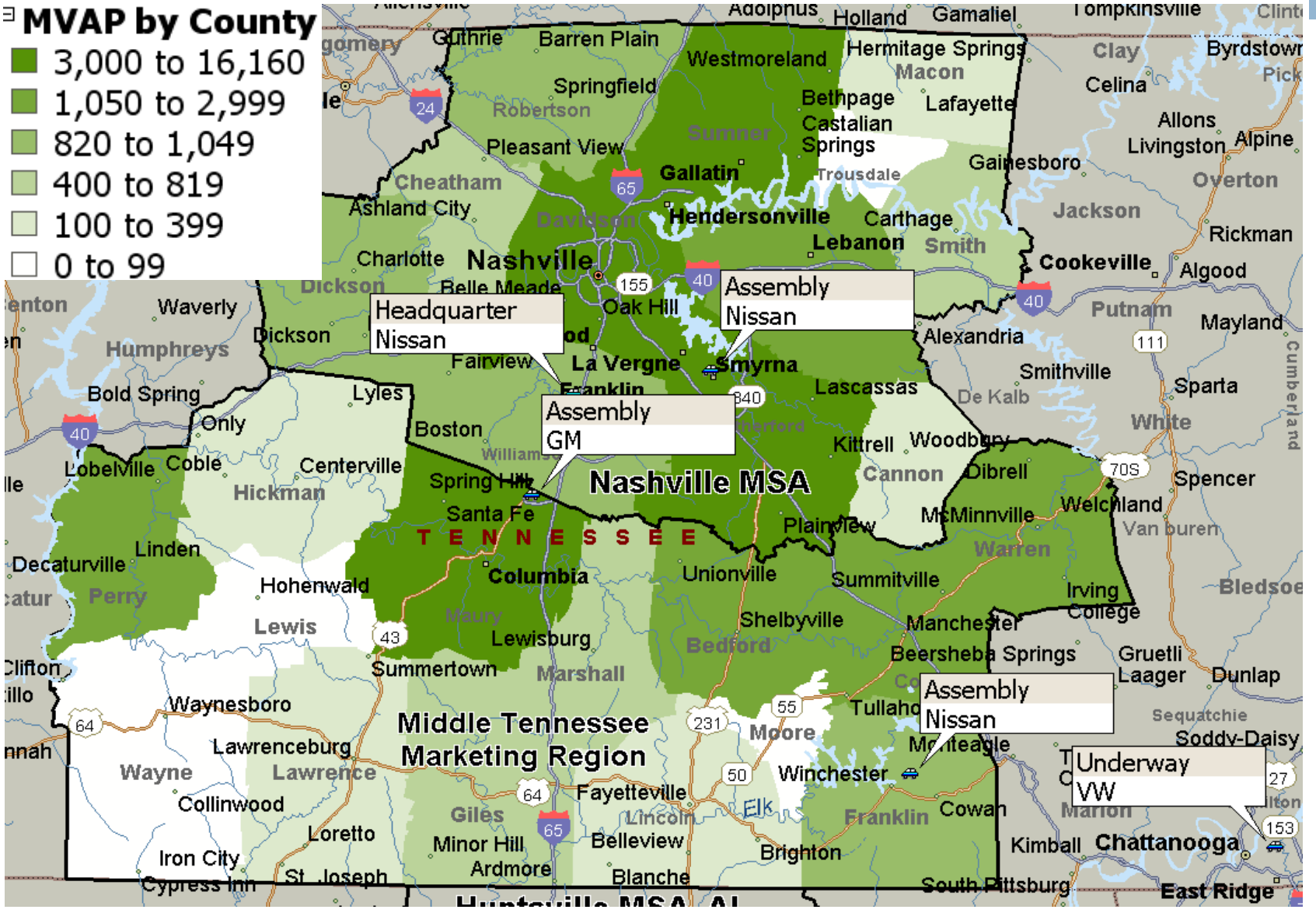
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

Although this group of clusters experienced employment decline over the years, it is still very strong and accounts for nearly half of the MTM region's exports

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

EMPLOYMENT DISTRIBUTION OF MOTOR VEHICLE & ASSOCIATED PRODUCTS (C13, C55 & C56)



VII. Target Clusters: Vital Signs, Employment Distribution and Detailed Profile

READING THE CLUSTER CHARTS

- **Next slides will show the specifics of each aggregated cluster**
  - **A** = Recent snapshot of the cluster in the region
  - **B** = Major sectors selling goods and services to the cluster
  - **C** = Major industries in the cluster
  - **D** = Major sectors buying goods and services from the cluster
  - **E** = Major commodities imported by the cluster in the region.
  - **F** = Includes industries that are members of the given cluster at the national level but absent from the region's cluster defined in block **C**
  - **G** = Major occupations employed by the cluster in the region.

CLUSTER PROFILE: A

Cluster number: C13, C55, C56
Cluster Name: Motor Vehicle and Associated Products
Cluster Status: MATURE (High concentration with slight decrease)
Technology Content: Semi-Technology Intensive

Establishments: 95 (2007 Q1)
Average Wage: $53,984 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 16,070 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Motor Vehicle Parts Manufacturing
Wholesale Trade
Automotive Repair & Maintenance
Truck Transportation
Glass and Glass Products
Automobile & Light Truck Manufacturing
Other Basic Inorganic Chemical Manufact.
Textile and Fabric Finishing Mills
Architectural and Engineering Services
Power Generation and Supply
Plastics Packaging Materials, Film & Sheet
Pesticide & Other Agricultural Chemical
Plastic Material & Resin Manufacturing
Plastics Plumbing Fixtures
Custom Compounding of Purchased Resin

CORE CLUSTER INDUSTRIES IN THE REGION: C

Automobile & Light Truck Manufacturing
Motor Vehicle Body Manufacturing
Travel Trailer & Camper Manufacturing
Motor Vehicle Parts Manufacturing
Other Aircraft Parts and Equipment
Tire Manufacturing
Rubber & Plastics Hose and Belting Man.
Sporting and Athletic Goods Manufact.
Gasket-Packing-and Sealing Device Man.
Bottons-Pins-and All Other Miscellaneous
Custom Compounding of Purchased Resin
Plastics Pipe-Fittings-and Profile
Resilient Floor Covering Manufacturing
Plastics Plumbing Fixtures and All Other
Foam Product Manufacturing

TOP INDUSTRIES BUYING FROM CLUSTER: D

Automobile & Light Truck Manufacturing
Motor Vehicle Parts Manufacturing
Tire Manufacturing
Automotive Repair & Maintenance
Truck Transportation
Waste Management & Remediation Services
Lawn & Garden Equipment Manufacturing
Glass & Glass Products
AC, Refrigeration, and Forced Air Heating
Other Snack Food Manufacturing
Toilet Preparation Manufacturing
Food Services & Drinking Places
Mattress Manufacturing
Pesticide & Other Agricultural Chemical Manufact.

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Motor Vehicle Parts Manufacturing	$3,441
Wholesale Trade	$304
Iron & Steel Mills	**$193**
Semiconductor & Related Device	**$154**
Other Engine Equipment Manufacturing	$134
Management of Companies & Enterprises	$125
Audio & Video Equipment Manufacturing	**$113**
All Other Misc. Professional and Technical	**$106**
Automotive Repair and Maintenance	$87
Tire Manufacturing	$69
Lessors of Nonfinancial Intangible Assets	**$67**
Motor Vehicle Body Manufacturing	**$59**
Ferrous Metal Foundaries	$46
Paint and Coating Manufacturing	$46
Turned Product & Screw-Nut-&Bolt Manu.	**$45**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Audio & Video Equipment Manufacturing
Electric Lamp Bulb & Part Manufacturing
Truck Trailer Manufacturing
Motorcycle, Bicycle & Parts Manufacturing
All Other Transport Equipment Manufacturing
Photographic Film & Chemical Manufacturing
Ammunition Manufacturing
Storage Battery Manufacturing
Primary Battery Manufacturing
Dental Equipment & Supplies Manufacturing
Synthetic Rubber Manufacturing
Cellulosic Organic Fiber Manufacturing
Noncellulosic Organic Fiber Manufacturing
Plastics Bottle Manufacturing

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

General & Operations Managers
Computer Software Engineers, Applications
Computer: Hardware Engineers
Electrical Engineers
Electronics Engineers, Except Computers
Engineers, All Other
First-Line Supervisors/Managers of Production & Operat.
Electrical and Electronic Equipment Assemblers
Compuetr-Controlled Machine Tool Operators
Numerical Tool and Process Control Programmers
Machinists
Art and Design Workers, All Other
Paper Goods Machine Setters, Operators, & Tenders
Life, Physical, and Social Science Technicians, All Other
Printing Machine Operators

Source: ES202 Data, IMPLANpro & BERC Estimates

VII. What is Next? I. Cluster Specific Recommendations

- Aggregate details for each group of clusters
  - Advanced Metal Manufacturing
    - Machine Tools Cluster
    - Nondurable Industry Machinery
    - Metalworking and Fabricated Metal Products

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

Cluster Vital Signs (Cluster Number)

Advanced Metal Manufacturing (C22, C32, C41)

Data Categories	Indicators	Explanation
Employment (E)		
E2006	7,436	Cluster employment
E Change 2002-06	-29.48%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.75	High concentration
LQ2006-2002	-1.2	Decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$46,534	Compensation per employment
Region's C as % of U.S.	86.19%	Lower than U.S.
Change in C 2006-2002 (%)	4.50%	Positive Growth
Productivity (PRO)		
PRO 2006	$244,176	Productivity
Change in PRO 2006-2002 (%)	39.77%	Strong positive trend
Region's PRO as % of U.S.	118.64%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$1,575	Total Export
EX as % of Output	86.71%	Exports a large portion of output
EX as % of Region's EX	10.13%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$1,005	Total Imports
Industry Mix Effect on Employment Growth	-12%	A relatively slow growing cluster
Regional Effect on Employment Growth	-26%	Negative locational advantage
Technology Sectors (%)	7.20%	Contains a few technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

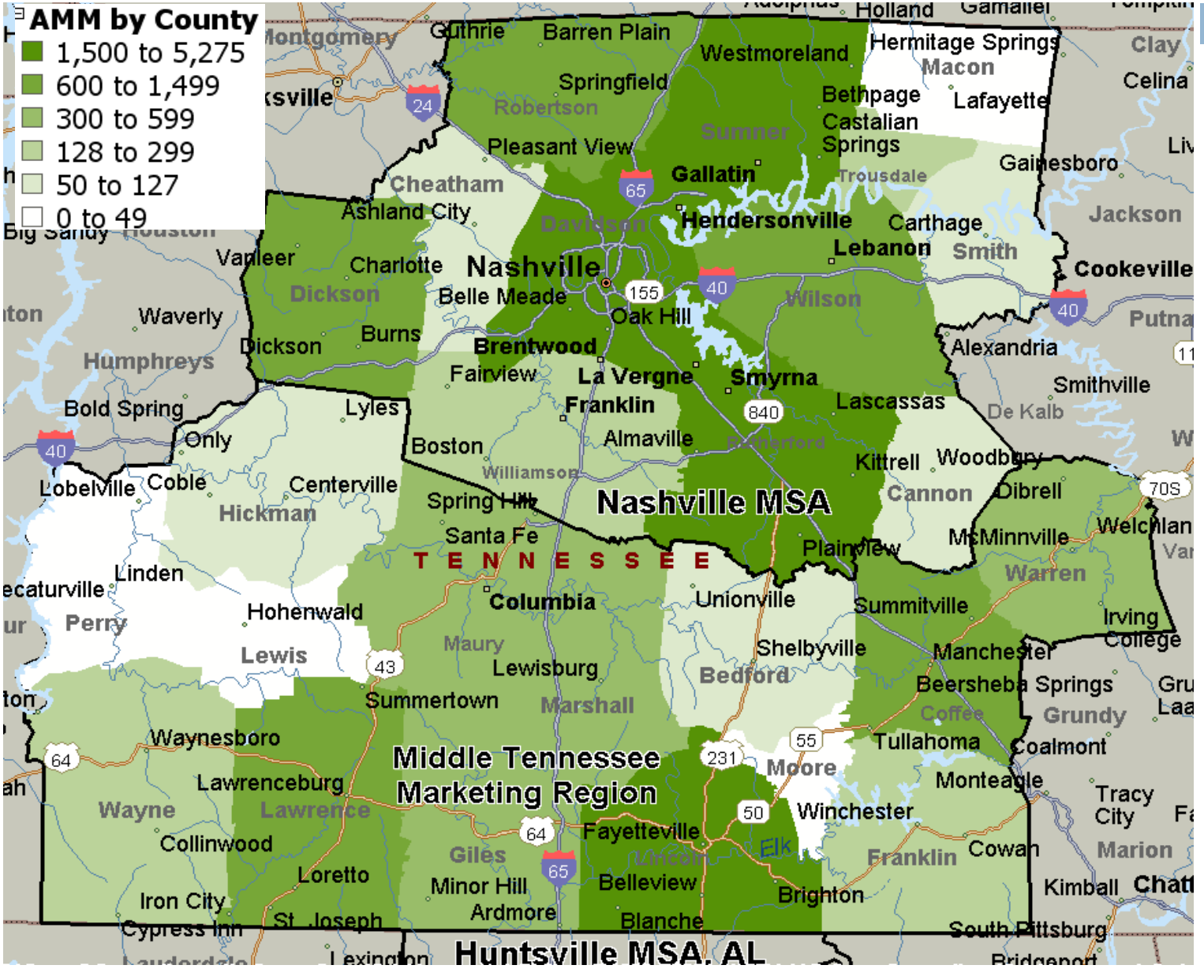
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

Significant employment loss due to the relocation of customer industries but it is still strong in the region

VII. What is Next? I. Cluster Specific Recommendations

EMPLOYMENT DISTRIBUTION OF ADVANCED METAL MANUFACTURING (C22, C32 & C41)

CLUSTER SPECIFIC RECOMMENDATIONS



CLUSTER PROFILE: A

Cluster number: C22, C32, C41
Cluster Name: Advanced Metal Manufacturing
Cluster Status: MATURE (High concentration with decrease)
Technology Content: 7.20%

Establishments: 197 (2007 Q1)
Average Wage: $37,824 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 5,707 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Motor Vehicle Parts Manufacturing
Wholesale Trade
Motor and Generator Manufacturing
Truck Transportation
Telecommunications
Machine Tools
Maintenance & Repair of Nonresidential B.
Sawmills
Burial Casket Manufacturing
Ball and Roller Bearing Manufacturing
Special Tool, Die, Jig & Fixture Manufact.
Power Generation & Supply
Real Estate
Plastics Plumbing Fixtures
Other State & Local Gov. Enterprises

CORE CLUSTER INDUSTRIES IN THE REGION: C

Sawmill & Woodworking Machinery
Plastics & Rubber Industry Machinery
Printing Machinery & Equipment Manufact.
All Other Industrial Machinery Manufact.
Other Commercial & Service Industry Man.
Iron & Steel Forging
Hand & Edge Tool Manufacturing
Hardware Manufacturing
Spring & Wire Product Manufacturing
Machine Shops
Steel Wire Drawing
All Other Forging & Stamping
Fabricated Structural Metal Manufacturing
Plate Work Manufacturing
Metal Window & Door Manufacturing

TOP INDUSTRIES BUYING FROM CLUSTER: D

Automobile & Light Truck Manufacturing
Motor Vehicle Parts Manufacturing
Scientific Research & Development Services
Motor & Generator Manufacturing
Commercial Printing
Waste Management & Remediation Services
Sawmills
Burial Casket Manufacturing
AC, Refrigeration, and Forced Air Heating
Machine Shops
Metal Tank, Heavy Gauge, Manufacturing
Aluminum Foundries
Soft Drink & Ice Manufacturing
Wholesale Trade
Mattress Manufacturing

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Iron & Steel Mills	$121
AC-Refrigeration-& Forced Air Heating	$105
Wholesale Trade	**$78**
Copper Rolling-Drawing-& Extruding	**$68**
Motor & Generator Manufacturing	$55
Management of Companies & Enterprises	$47
All Other Misc. Professional and Technical	**$23**
Automatic Environmental Control Manu.	**$21**
Aluminum Sheet-Plate-& Foil Manufact.	$20
Ferrous Metal Foundaries	$18
Semiconductors & Related Device	**$17**
Fabricated Structural Metal Manufacturing	**$7**
Hardware Manufacturing	$6
Steel Wire Drawing	$6
Machine Shops	**$5**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Food Product Machinery Manufacturing
Pump & Pumping Equipment Manufacturing
Other Engine Equipment Manufacturing
Scales, Balances & Misc. General Pupose Mach
Measuring & Dispensing Pump Manufacturing
Saw Blade & Handsaw Manufacturing
Small Arms Manufacturing
Industrial Pattern Manufacturing
Air Purification Equipment Manufacturing
Industrial & Commercial Fan & Blower Manu.
Custom Roll Forming
Prefabricated Metal Buildings & Components
Power Boiler & Heat Exchanger Manufacturing
Conveyor & Conveying Equipment Manufact.
Military Armored Vehicles & Tank Parts Man.

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

General & Operations Managers
Maintenance & Repair Workers, General
Assemblers & Fabricators, All Other
Forging Machine Setters, Operators, & Tenders, Metal
Cutting, Punching, & Press Machine Setters, Operators
Drilling & Boring Machine Tool Setters, Operators
First-Line Supervisors/Managers of Production & Operat.
Welders, Cutters, Solderers & Brazers
Bindery workers
Crushing, Grinding, & Polishing Machine Setters, Operators
Machinists
Truck Drivers, Heavy and Tractor-Trailer
Industrial Truck & Tractor Operators
Inspectors, Testers, Sorters, Samplers, & Weighers
Sewing Machine Operators

Source: ES202 Data, IMPLANpro & BERC Estimates

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

- Aggregate details of each group of clusters

- Information Technology and Precision Instrument Manufacturing
  - Optical Equipment and Instruments Cluster
  - Computer and Electronic Equipment Cluster
  - Information Services

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

Cluster Vital Signs (Cluster Number)

Information Technology and Precision Manufacturing (C11, C72, C132)

Data Categories	Indicators	Explanation
Employment (E)		
E2006	5,845	Cluster employment
E Change 2002-06	3.64%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	0.82	Low concentration
LQ2006-2002	0.08	Increase in relative concentration
Employee Compensation (C)		
Average C (2006)	$44,686	Compensation per employment
Region's C as % of U.S.	74.73%	Lower than U.S.
Change in C 2006-2002 (%)	16.35%	Positive Growth
Productivity (PRO)		
PRO 2006	$178,887	Productivity
Change in PRO 2006-2002 (%)	39.77%	Strong positive trend
Region's PRO as % of U.S.	91.44%	Slightly lower than U.S.
Export (EX)		
EX 2006 (Million $)	$602	Total Export
EX as % of Output	57.59%	Exports little over half of output
EX as % of Region's EX	3.87%	Not a significant player in the region
Imports (IM)		
IM 2006 (Million $)	$357	Total Imports
Industry Mix Effect on Employment Growth	-19%	A relatively slow growing cluster
Regional Effect on Employment Growth	14%	Positive locational advantage
Technology Sectors (%)	39.21%	Contains technology sectors

*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

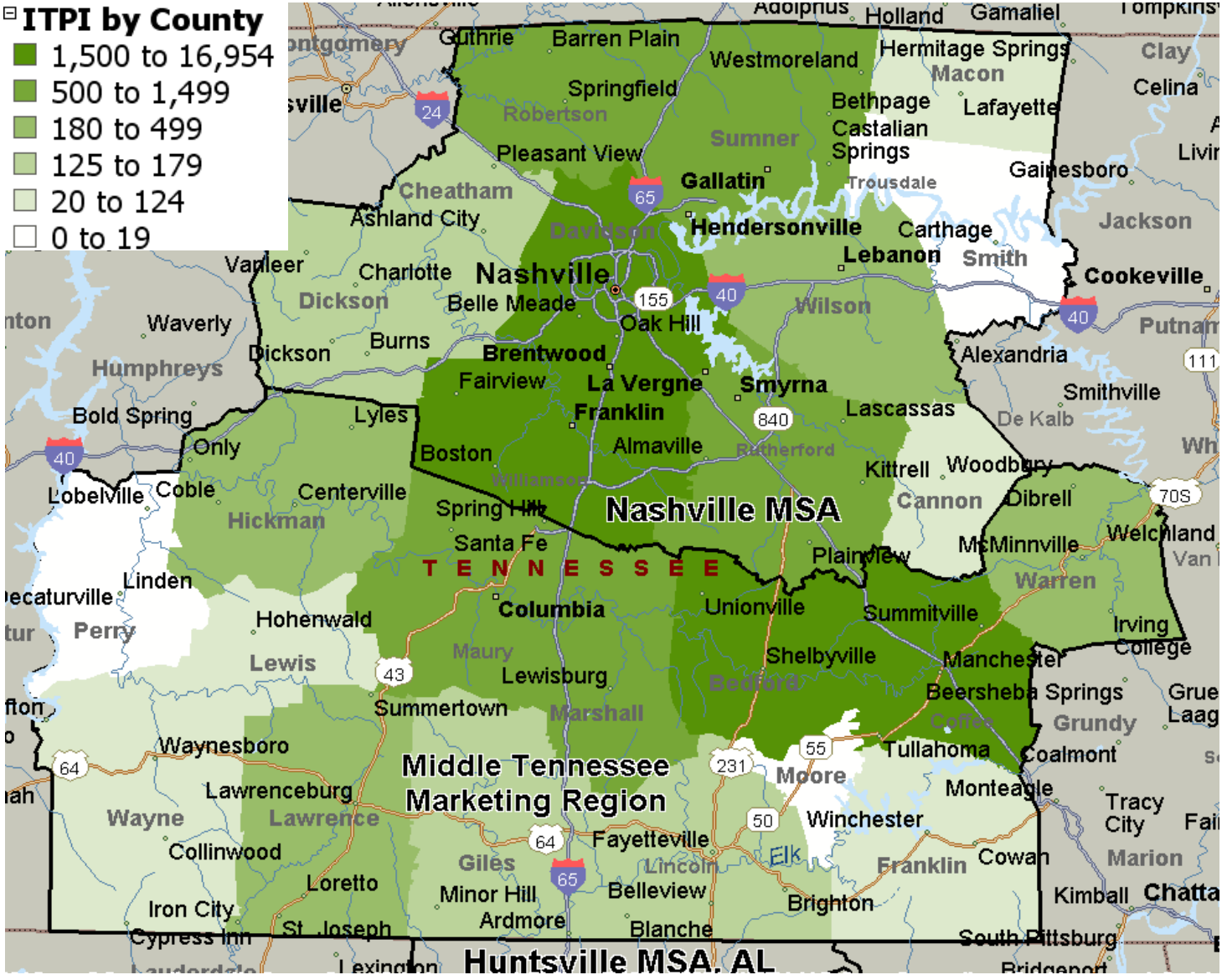
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

It is an emerging cluster with strong potential in the region due to this cluster's nature: enabling, technology intensive and basic

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

EMPLOYMENT DISTRIBUTION OF INFORMATION TECH. & PRECISION MANUFACTURING (C11, C72 & C132)



CLUSTER PROFILE: A

Cluster number: C11, C72, C132
Cluster Name: Information Tech.& Precision Instrument Manufacturing
Cluster Status: EMERGING (Low concentration with increase)
Technology Content: Semi-Technology Intensive

Establishments: 197 (2007 Q1)
Average Wage: $39,774 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 6,692 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Wholesale Trade
Truck Transportation
Plastics Packaging Materials, Film & Sheet
Office Supplies, Except Paper, Manu.
Sawmills
Plastics Plumbing Fixtures
Wood Container & Pallet Manufacturing
Telecommunications
Architectural and Engineering Services
Accounting & Bookkeeping Services
Household Goods Repair & Maintenance
All Other Electronic Component Manufact.
Scientific Research & Development Servi.
Employment Services
Real Estate

CORE CLUSTER INDUSTRIES IN THE REGION: C

Surgical & Medical Instrument Manufact.
Surgical Appliance & Supplies Manufacturing
Office Supplies, Except Paper, Manufact.
Musical Instrument Manufacturing
Information Services
Data Processing Services
Custom Computer Programming Services
Computer Systems Design Services
Electronic Equipment Repair & Maintenance
Broadcast & Wireless Communications
All Other Electronic Component Manufact.
Industrial Process Variable Instruments
Irradiation Apparatus Manufacturing
Watch-Clock-and Other Measuring
Miscellaneous Electrical Equipment Manu.

TOP INDUSTRIES BUYING FROM CLUSTER: D

Office Supplies, Except Paper, Manufacturing
Surgical Appliance & Supplies Manufacturing
Toilet Preparation Manufacturing
Other Ambulatory Health Care Services
Surgical & Medical Instrument Manufacturing
Veterinary Services
Telecommunications
Motor Vehicle Parts Manufacturing
AC, Refrigeration, and Forced Air Heating
Scientific Research & Development Services
Waste Management & Remediation Services
Data Processing Services
Automobile & Light Truck Manufacturing
All Other Electronic Component Manufacturing
Industrial Process Variable Instruments

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Semiconductor & Related Device	$36
Telecommunications	$30
Wholesale Trade	**$29**
Management of Companies & Enterprise	**$16**
Paperboard Container Manufacturing	$12
All Other Misc. Professional & Technical	$12
Office Supplies-Except Paper-Manufact.	**$9**
Other Basic Organic Chemical Manufact.	**$8**
Architectural & Engineering Services	$7
All Other Electronic Component Manufact.	$7
Synthetic Dye and Pigment Manufact.	**$6**
Plastics Pipe-Fittings-and Profile Shapes	**$5**
Paper and Paperboard Mills	$5
Broadcast & Wireless Communications	$4
Accounting & Bookkeeping Services	**$4**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Photographic Film & Chemical Manufacturing
Plastics Bottle Manufacturing
Audio & Video Reproduction
Magnetic & Optical Recording Media Manu.
Ophthalmic Goods Manufacturing
Software Publishers
Office Machinery Manufacturing
Electronic Computer Manufacturing
Computer Storage Device Manufacturing
Electron Tube Manufacturing
Semiconductors & Related Device Manufact.
Electromedical Apparatus Manufacturing
Search, Detection & Navigation Instruments
Electricity & Signal Testing Instruments
Analytical Laboratory Instrument Manuf.

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

Electromechanical Equipment Assemblers
Maintenance Workers, Machinery
Assemblers and Fabricators, All Other
Broadcast Technicians
Packaging & Filling Machine Operators and Tenders
Mechanical Engineers
First-Line Supervisors/Managers of Production & Operat.
Electrical and Electronic Equipment Assemblers
Mechanical Drafters
Computer, Automated Teller, and Office Machine Repairers
Machinists
Engine and Other Machine Assemblers
Welders, Cutters, Solderers, and Brazers
Welding, Soldering, and Brazing Machine Setters, Operators
General and Operations Managers

Source: ES202 Data, IMPLANpro & BERC Estimates

VII. What is Next? I. Cluster Specific Recommendations

- Aggregate details of each group of clusters
  - Agribusiness
    - Breweries and Distilleries
    - Packaged Goods Products

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

Cluster Vital Signs (Cluster Number)

Agribusiness (C92, C151)

Data Categories	Indicators	Explanation
Employment (E)		
E2006	3,704	Cluster employment
E Change 2002-06	-6.28%	Employment change
Specialization (LQ) (relative to U.S.)*		
LQ2006	2.55	High concentration
LQ2006-2002	-0.26	Slight decrease in relative concentration
Employee Compensation (C)		
Average C (2006)	$47,171	Compensation per employment
Region's C as % of U.S.	104.28%	Significantly higher than U.S.
Change in C 2006-2002 (%)	16.69%	Positive Growth
Productivity (PRO)		
PRO 2006	$466,225	Productivity
Change in PRO 2006-2002 (%)	72.94%	Strong positive trend
Region's PRO as % of U.S.	126.30%	Significantly higher than U.S.
Export (EX)		
EX 2006 (Million $)	$1,528	Total Export
EX as % of Output	88.55%	Exports nearly all of output
EX as % of Region's EX	9.83%	A significant player in the region
Imports (IM)		
IM 2006 (Million $)	$618	Total Imports
Industry Mix Effect on Employment Growth	-10%	A relatively slow growing cluster
Regional Effect on Employment Growth	-5%	Negative locational advantage
Technology Sectors (%)	1.00%	Contains a few technology sectors

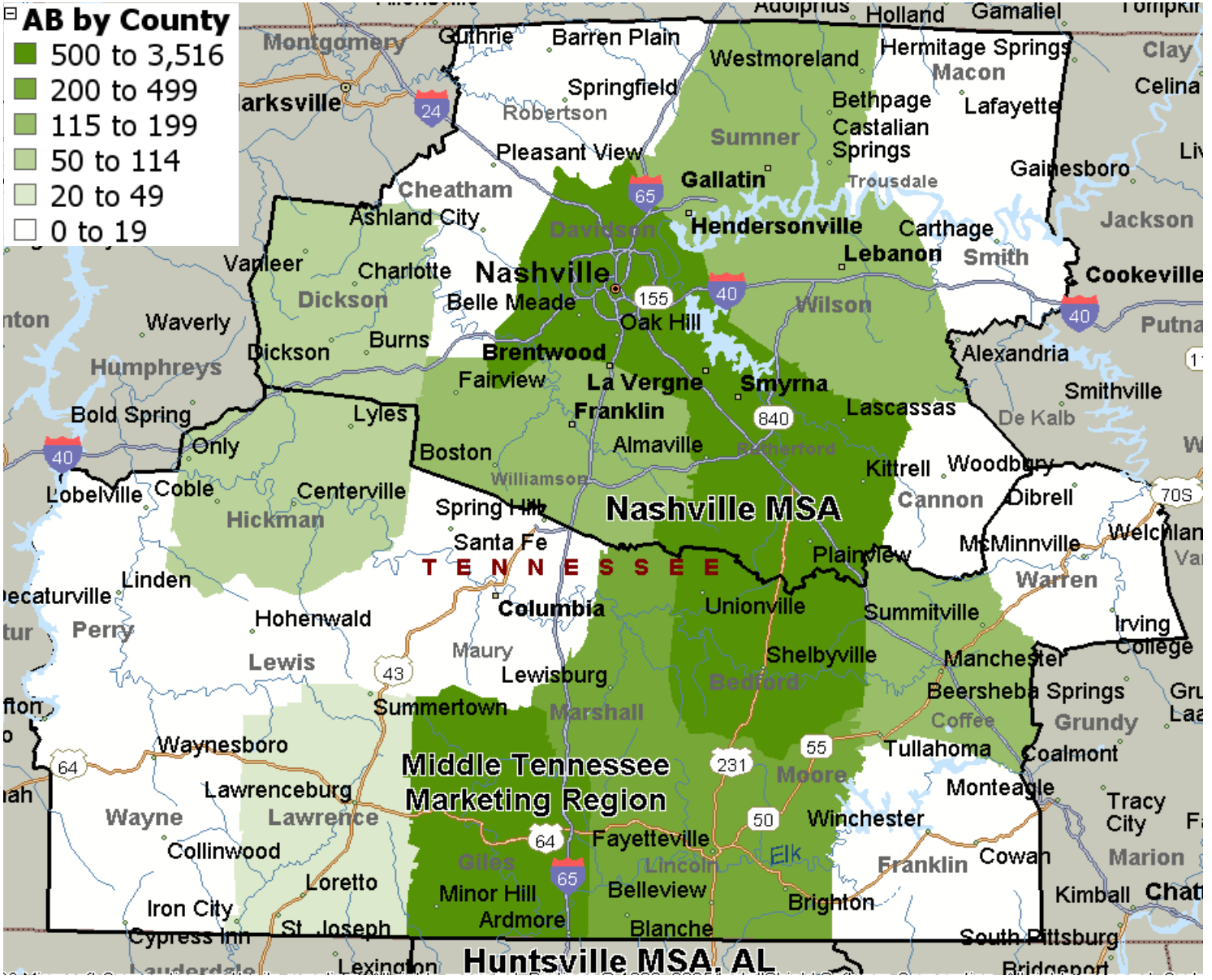
*LQ=1, Non-basic (average concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ<1, Non-basic (less concentration of cluster in the region compared to the same cluster in the reference region (U.S.)
LQ>1, Basic (high concentration of cluster in the region compared to the same cluster in the reference region (U.S.)

Region has unique assets to leverage to promote these clusters

VII. What is Next? I. Cluster Specific Recommendations

CLUSTER SPECIFIC RECOMMENDATIONS

EMPLOYMENT DISTRIBUTION OF AGRIBUSINESS (C92 & C151)


AB by County
500 to 3,516
200 to 499
115 to 199
50 to 114
20 to 49
0 to 19
Nashville
Nashville MSA
Middle Tennessee Marketing Region
Huntsville MSA, AL
TENNESSEE
Montgomery
Guthrie
Barren Plain
Springfield
Robertson
Sumner
Pleasant View
Gallatin
Hendersonville
Cheatham
Ashland City
Davidson
Dickson
Belle Meade
Oak Hill
Wilson
Lebanon
Carthage
Smith
Cookeville
Jackson
Putnam
Alexandria
Smithville
De Kalb
Waverly
Burns
Brentwood
Fairview
La Vergne
Smyrna
Franklin
Lascassas
Humphreys
Bold Spring
Lyles
Only
Boston
Almaville
Williamson
Rutherford
Kittrell
Woodbury
Cannon
Dibrell
Lobelville
Coble
Centerville
Hickman
Spring Hill
Santa Fe
Columbia
Linden
Hohenwald
Perry
Lewis
Maury
Lewisburg
Summertown
Marshall
Unionville
Summitville
Shelbyville
Bedford
Manchester
Beersheba Springs
Grundy
Coffee
Tullahoma
Coalmont
Moore
Monteagle
Warren
McMinnville
Plainview
Irving College
Waynesboro
Lawrenceburg
Wayne
Lawrence
Collinwood
Loretto
Iron City
Cypress Inn
St. Joseph
Lexington
Minor Hill
Ardmore
Belleview
Blanche
Fayetteville
Lincoln
Giles
Elk
Winchester
Franklin
Cowan
Brighton
Tracy City
Marion
Kimball
South Pittsburg
Bridgeport
Gamaliel
Holland
Adolphus
Hermitage Springs
Macon
Lafayette
Bethpage
Castalian Springs
Trousdale
Gainesboro
Clay
Celina
Charlotte
Vanleer
Dickson
Burns
Williamson
Rutherford
Cannon
Warren
Grundy
Coffee
Moore
Lincoln
Giles
Elk
Marion
Franklin
Lawrence
Wayne
Hickman
Perry
Lewis
Maury
Marshall
Bedford
Coffee
Grundy
Warren
Cannon
Dibrell
Kittrell
Woodbury
Smithville
De Kalb
Jackson
Putnam
Cookeville
Macon
Sumner
Wilson
Davidson
Williamson
Rutherford
Smith
Trousdale
Gainesboro
Clay
Celina
Hermitage Springs
Lafayette
Bethpage
Castalian Springs
Westmoreland
Adolphus
Holland
Gamaliel
Barren Plain
Guthrie
Montgomery
Springfield
Robertson
Pleasant View
Gallatin
Hendersonville
Carthage
Lebanon
Smith
Cookeville
Jackson
Putnam
Alexandria
Smithville
De Kalb
Lascassas
Smyrna
La Vergne
Franklin
Brentwood
Fairview
Belle Meade
Oak Hill
Nashville
Charlotte
Vanleer
Dickson
Burns
Waverly
Humphreys
Bold Spring
Lyles
Only
Boston
Almaville
Kittrell
Woodbury
Cannon
Dibrell
McMinnville
Warren
Irving College
Manchester
Beersheba Springs
Grundy
Coffee
Tullahoma
Coalmont
Monteagle
Tracy City
Marion
Kimball
South Pittsburg
Bridgeport
Winchester
Franklin
Cowan
Brighton
Belleview
Blanche
Minor Hill
Ardmore
Fayetteville
Lincoln
Giles
Elk
Moore

CLUSTER PROFILE: A

Cluster number: C92, C151
Cluster Name: Agribusiness
Cluster Status: MATURE (High concentration with slight decrease)
Technology Content: Small

Establishments: 36 (2007 Q1)
Average Wage: $35,533 (2007 Q1)
Higher than the region's average wage of $33,192
Total Employment: 4,041 (2007 Q1)

SYNERGIES BETWEEN CLUSTER AND EXISTING REGIONAL INDUSTRIES: BUYING-SELLING RELATIONSHIP

TOP INDUSTRIES SELLING TO CLUSTER: B

Poultry and Egg Production
Poultry Production
Cattle Ranching and Farming
Wholesale Trade
Truck Transportation
Animal Production, Except Cattle & Poultry
Plastics Packaging Materials, Film & Sheet
Toilet Preparation Manufacturing
Plastics Plumbing Fixtures
Scientific Research and Development Serv.
Wood Container and Pallet Manufacturing
Distillleries
Commercial Printing
Advertising and Related Services
Other State and Local Government Enter.

CORE CLUSTER INDUSTRIES IN THE REGION: C

Fruit and Vegetable Canning and Drying
Soft Drink and Ice Manufacturing
Wineries
Distilleries
Toilet Preparation Manufacturing
Confectionery Manufacturing From Purchased
Animal-Except Poultry-Slaughtering
Meat Processed from Carcasses
Poultry Processing
Bread and Bakery Product-Except Frozen
Other Snack Food Manufacturing
Mayonnaise-Dressing-and Sauce Manufact.
All Other Food Manufacturing

TOP INDUSTRIES BUYING FROM CLUSTER: D

Poultry Processing
Leather & Hide Tanning and Finishing
Animal-Except Poultry-Slaughtering
Other Snack Food Manufacturing
Toilet Preparation Manufacturing
Distilleries
Personal Care Services
Soft Drink and Ice Manufacturing
Services to Building and Dwellings
Scientific Research and Development Services

STRENGHTENING CLUSTER SUPPLY-CHAIN, INCREASING DIVERSITY WITHIN THE CLUSTER, AND ADDRESSING WORKFORCE ISSUES

TOP COMMODITIES IMPORTED (Million $): E

Wholesale Trade	$91
Management of Companies & Enterprises	$77
Distilleries	**$39**
Paperboard Container Manufacturing	**$30**
Plastics Bottle Manufacturing	$21
Glass Container Manufacturing	$19
All Other Misc. Professional & Technical	**$19**
Poultry & Egg Production	**$17**
Metal Can-Box-and Other Container Man.	$17
Petroleum Refineries	$17
Fats & Oils Refining and Blending	**$11**
Grain Farming	**$9**
Plastics Pipe-Fittings-and Profile Shapes	$9
Flour Milling	$9
Flavoring Syrup & Concentrate Manufact.	**$8**

MISSING CLUSTER INDUSTRIES (GAP) FROM MTM: F

Breakfast Cereal Manufacturing
Coffee and Tea Manufacturing
Confectionery Manufact. from Cacao Beans
Cookie & Cracker Manufacturing
Dry Pasta Manufacturing
Fats & Oils Refining and Blending
Flavoring Syrup & Concentrate Manufacturing
Frozen Cakes & Other Pastries Manufacturing
Frozen Food Manufacturing
Mixes & Dough Made from Purchased Flour
Nonchocolate Confectionery Manufacturing
Roasted Nuts & Peanut Butter Manufacturing
Breweries
Spice and Extract Manufacturing
Seafood Product Preparation & Packaging

MAJOR CLUSTER OCCUPATIONS EMPLOYED IN MTM: G

Maintenance Workers, Machinery
Packaging & Filling Machine Operators and Tenders
First-Line Supervisors/Managers of Production & Operat.
Bakers
Food Preparation Workers
Industrial Truck and Tractor Operators
Inspectors, Testers, Sorters, Samplers, and Weighers
Janitors & Cleaners, Except Maids and Housekeeping
Laborers & Freight, Stock, and Material Movers, Hand
Multiple Machine Tool Setters, Operators, & Tenders
General and Operations Managers
Packers & Packagers, Hand
Paper Goods Machine Setters, Operators, and Tenders
Truck Drivers, Heavy and Tractor-Trailer

Source: ES202 Data, IMPLANpro & BERC Estimates

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing

2. Regional Level Workforce Analysis
3. In-Depth Cluster Needs Assessment
4. Emerging Clusters/Areas: High-Tech
5. Emerging Clusters/Areas: Tourism
6. Specific Policy Priorities

VII. What is Next? Recommendations: 1. Regional Level Marketing

- Develop a list of target industries based on the cluster analysis
  - Rural community leaders should work together to market the region as a "region" rather than individual counties
    - This requires a strong commitment on the part of leadership to work together to promote region using multiple venues
      - Marketing Materials
      - Business Expos and Trade Shows
  - Community leaders should communicate with existing businesses to market their products and brand names
    - This will further promote successful business recruitment to the region

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. ***Regional Level Workforce Analysis***
3. In-Depth Cluster Needs Assessment
4. Emerging Clusters/Areas: High-Tech
5. Emerging Clusters/Areas: Tourism
6. Specific Policy Priorities

VII. What is Next? Recommendations: 2. Regional Level Workforce Analysis

- Availability and quality of workforce are critically important for a region to improve its economic well-being
  - Engage the State, ECD and Department of Labor and Workforce Development for more comprehensive study in region
    - Unemployed vs. Underemployed
    - Qualities of Unemployed and Underemployed
    - Type of Workers (Occupation)
  - Engage TVA, USDA, EDA to support the comprehensive review of the state of workforce in rural areas

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. Regional Level Workforce Analysis
3. ***In-Depth Cluster Needs Assessment***
4. Emerging Clusters/Areas: High-Tech
5. Emerging Clusters/Areas: Tourism
6. Specific Policy Priorities

VII. What is Next? Recommendations: 3. In-Depth Cluster Needs Assessment

- Now that we identified target clusters, the next step is to conduct an in-depth needs assessment for each of the aggregated clusters
  - This will involve but not limited to
    - Identifying a champion from industry for each of the aggregated cluster
    - Conducting several topical focus group meetings
      - Cluster workforce
      - Cluster supply-chain
      - Other issues
    - Interviewing the prominent members of cluster to identify cluster specific investment areas to increase regional competitiveness

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. Regional Level Workforce Analysis
3. In-Depth Cluster Needs Assessment
4. ***Emerging Clusters/Areas: High-Tech***
5. Emerging Clusters/Areas: Tourism
6. Specific Policy Priorities

VII. What is Next? Recommendations: 4. Emerging Clusters/Areas: High-Tech

EMERGING AREAS: HIGH-TECH CORRIDOR

- Interviews and surveys identified several potential/emerging clusters in the region
- One potential area is

  - Aerospace and Defense Cluster/ Alternative Energy/ High Tech

VII. What is Next? Recommendations: 4. Emerging Clusters/Areas: High-Tech

HIGH TECHNOLOGY

•While focusing on high-tech and synergy between defense-related establishments, the region also should pay close attention to developments in alternative energy

"Tennessee to help build biofuel plant: Switchgrass to be distilled"

Tennessean, 7/23/2008

VII. What is Next? Recommendations: 4. Emerging Clusters/Areas: High-Tech

HIGH TECHNOLOGY

The region has all necessary ingredients to be a "high-tech" corridor

- Region's own Arnold Engineering and Development Center (AEDC) and existing and potential developments just south of the border (Huntsville MSA, AL) constitutes the seed of this potential corridor
  - AEDC (Engine Testing and Flight Simulation) (Coffee and Franklin Counties)
  - Missile Defense System (Huntsville MSA, AL)
  - Redstone Arsenal Expansion (Huntsville MSA, AL) as part of the Base Realignment and Closure (BRAC) Commission recommendations
- A cross border synergy is necessary to activate this corridor

VII. What is Next? Recommendations: 4. Emerging Clusters/Areas: High-Tech

A region must have a mega site to successfully attract an auto manufacturer

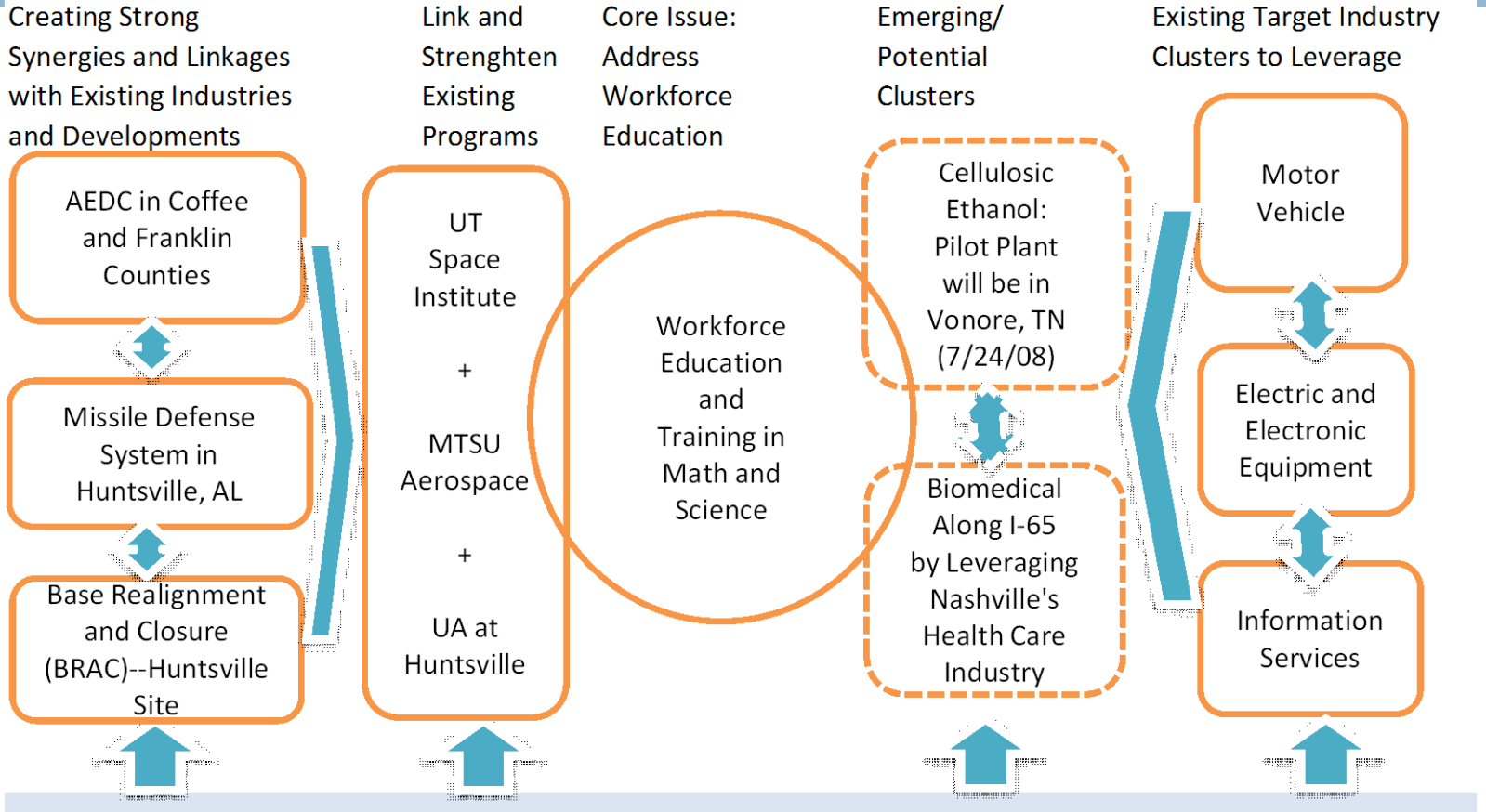
VII. What is Next? Recommendations: 4. Emerging Clusters/Areas: High-Tech

- To use similar analogy, a region must have three foundations intact to attract high-tech & high-paying jobs
  - Educated Workforce
    - Fast-track training facilities at the regional level
    - Improving K-12 system
    - Setting up branch campuses of area universities
  - Information Technology (Broadband) Infrastructure
    - Expanding broadband access throughout the rural communities
  - Physical Infrastructure (Including Highways)
    - Site preparation
    - Aging infrastructure in rural areas
    - Highways (I-64)

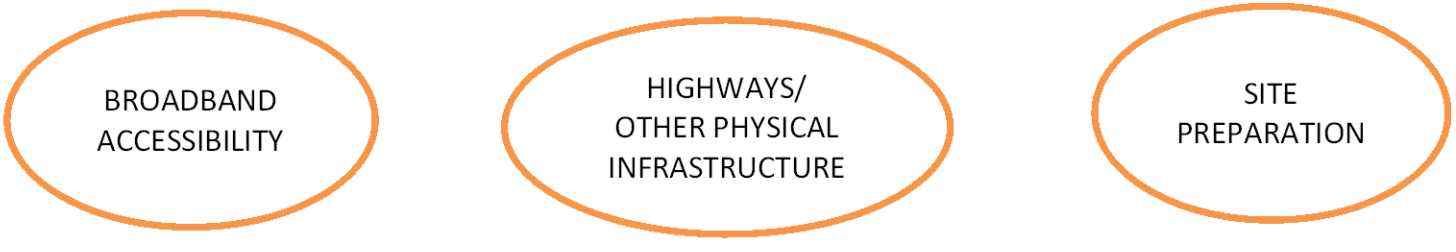
VII. What is Next? Recommendations:
4. Emerging Clusters/Areas: High-Tech

HIGH TECHNOLOGY

FUTURE OF THE REGION--AEROSPACE, DEFENSE, MOTOR VEHICLE, AND SWITCHGRASS(!):
BUILDING A HIGH-TECHNOLOGY CORRIDOR BY CREATING SYNERGIES AMONG EXISTING RESOURCES



CRITICAL INFRASTRUCTURE NEEDS TO BE ADDRESSES



VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. Regional Level Workforce Analysis
3. In-Depth Cluster Needs Assessment
4. Emerging Clusters/Areas: High-Tech
5. ***Emerging Clusters/Areas: Tourism***
6. Specific Policy Priorities

VII. What is Next? Recommendations: 5. Emerging Clusters/Areas: Tourism

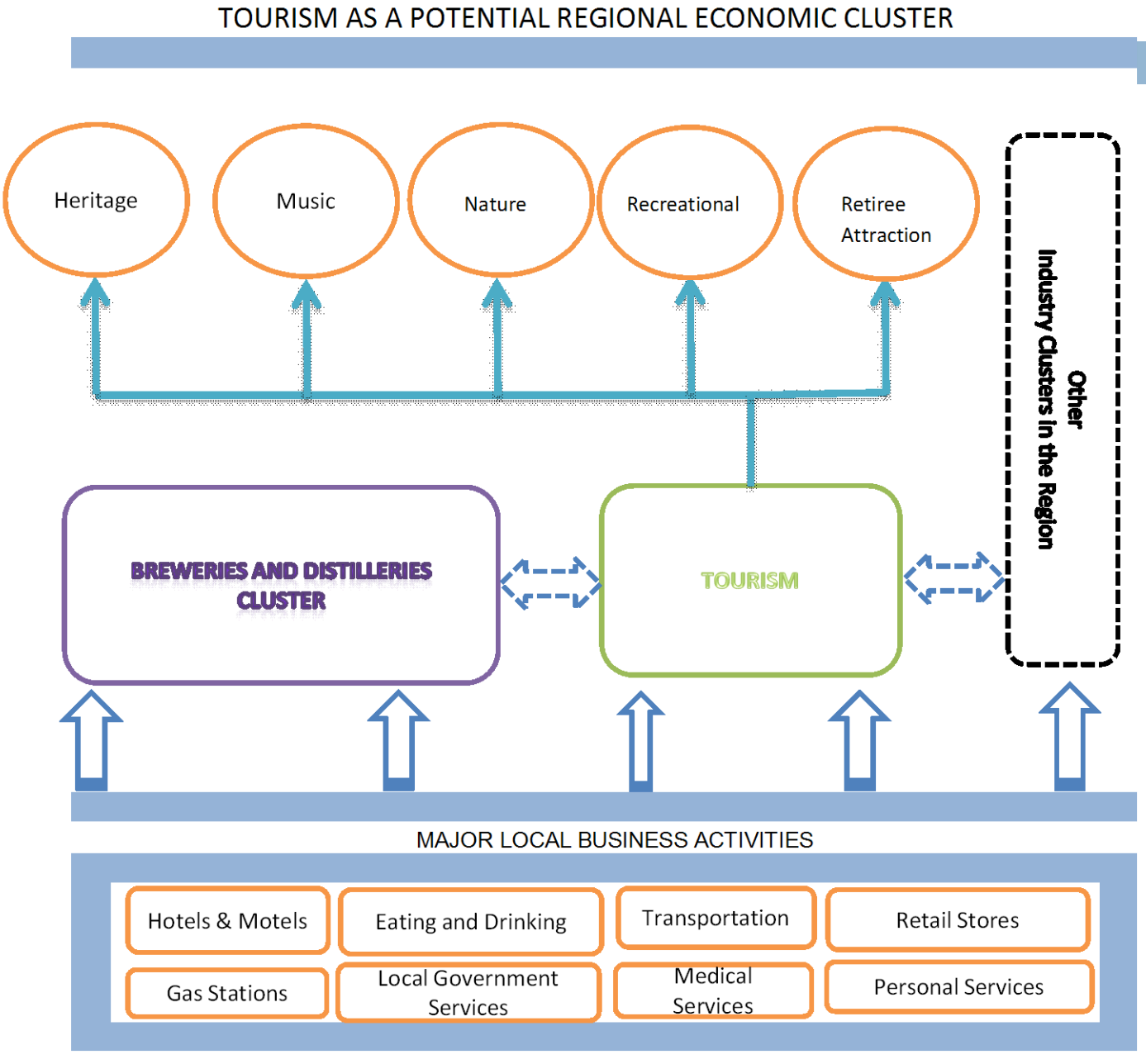
EMERGING AREAS: TOURISM

- Interviews and surveys identified several potential/emerging clusters in the region
- Another potential area is

  - Tourism/ Agribusiness

VII. What is Next? Recommendations:
5. Emerging Clusters/Areas: Tourism

TOURISM



The region has a full potential of developing a tourism cluster based on the existing resources

VII. What is Next? Recommendations: 5. Emerging Clusters/Areas: Tourism

TOURISM

Region's potential for "TOURISM"

- •Region has a diverse set of "brand names" to leverage for this purpose
- •In addition, regional diversity in terms of economic development also necessitates different sets of economic development strategies
  - •Perry, Lewis and Wayne corridor could be successfully connected to the region using this venue
- •Major world renowned brands: Jack Daniels, George Dickel and Bonnaroo
  - •In addition, "elephant sanctuary" in Lewis, "farm community" in Lewis, "gospel music" in Lawrence, "Amish community" in Lawrence, "walking horse celebrations" in Bedford, "mule day" in Maury are a few other examples to cite.

VII. What is Next? Study Recommendations

I. Cluster Specific Recommendations

II. What is Next? Recommendations for Region

1. Regional Level Marketing
2. Regional Level Workforce Analysis
3. In-Depth Cluster Needs Assessment
4. Emerging Clusters/Areas: High-Tech
5. Emerging Clusters/Areas: Tourism
6. ***Specific Policy Priorities***

VII. What is Next? Recommendations: 6. Specific Policy Priorities

POLICY PRIORITIES

- Small businesses constitute a significant percent of establishments and jobs in the region
  - A significant portion of these businesses employs 1-9 people
- Business incentives available at the state and local level often bypass these businesses
- Even if these small businesses are eligible for certain incentives, bureaucratic procedures discourage them to go through the process
- **Community leaders should work with state officials to revise existing business incentive requirements to encourage small business formation and entrepreneurship in rural communities**

Thank you!

Questions?

For more information about the center and our publications, please visit

www.mtsu.edu/~berc

Economic Diversity in Middle Tennessee Marketing Region

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Section I: Overview

- As a concept, economic diversity refers to having a healthy mix of sectoral employment/resource base.
- Economic (sectoral) vulnerability is defined as having a regional economic mix concentrated in a few sectors thereby making the region's economy vulnerable to economic shocks.
- To measure the economic diversity, many studies utilize Herfindahl-type index, which measures firm concentrations and competition in a given sector.
- This study utilizes a measure similar to Herfindahl-Hirschman Index as well as an extension of it to measure "effective number of sub-sectors."
- This measure is important for regions whose economy heavily depends on a few major sectors.

Section II: Methodology

- Sectoral diversity is measured at 4-digit NAICS level. According to 2007 Q1 ES202 data, there were 316 sub-sectors at this level in Tennessee.
- BERC utilized fractionalization index to estimate the level of economic diversity.
  - This index is defined as $D = 1 - \sum s_i^2$, where D=diversity index and (s) is the employment share of sector (i) in a regional economy.
  - BERC then used a related measure to drive "effective number" of sub-sectors in a region based on the level of diversity. This measure is defined as: $e = 1/(1-D)$, where (e) refers to the effective number of sub-sectors and (D) is diversity index as defined above.
- These indexes are from the same family of measures as Herfindahl-Hirschman Index.
- A word of caution in interpreting these two measures: although lack of diversity in a given regional economy is interpreted as vulnerability, in certain cases, this may also be interpreted as the strength of a regional economy because of the region's specialization in certain areas.
  - Many regions attempt to strike a balance between desire for diversity and having a competitive edge in specific areas.

Section III: Findings: Major Industry Groupings, Employment Share, and Sectoral Dependency

- Sectoral dependency is defined as a sector having more than 20 percent of employment share in the region.
- As of 2007 Q1, 11 of 14 counties in the region depends on manufacturing sector.
- Coffee County has large presence of enabling industries, which are industries that include finance, business, professional and management services.

Section III: Findings: Major Industry Groupings, Employment Share, and Sectoral Dependency (Continued)

Employment by Major Industry Groupings and Percent Share (2007 Q1)

County	Agriculture, Mining, Construction and Utilities		Manufacturing		Wholesale and Retail Trade		Transportation and Warehousing	
	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)
Bedford	1,163	6.14	**7,083**	**37.41**	2,156	11.39	1,411	7.45
Coffee	1,262	4.51	**6,773**	**24.19**	3,949	14.10	334	1.19
Franklin	727	6.37	**2,221**	**19.45**	1,637	14.33	213	1.87
Giles	589	6.55	**2,697**	**30.03**	1,480	16.48	244	2.72
Hickman	405	11.74	**671**	**19.45**	355	10.31	113	3.28
Lawrence	588	5.44	**2,342**	**21.66**	**2,588**	**23.94**	633	5.86
Lewis	224	8.17	246	8.97	**666**	**24.30**	170	6.21
Lincoln	585	6.15	**2,775**	**29.19**	1,621	17.05	185	1.94
Marshall	524	5.49	**3,336**	**35.00**	1,361	14.28	214	2.24
Maury	1,619	4.95	**6,802**	**20.78**	4,590	14.02	1,000	3.05
Moore	86	5.95	226	15.67	**298**	**20.72**		
Perry	81	3.15	**1,345**	**52.54**	161	6.28	46	1.81
Warren	1,425	10.39	**3,998**	**29.15**	2,284	16.65	278	2.03
Wayne	203	4.38	828	17.90	457	9.88	70	1.51
Study Region	9,479	5.98	**41,342**	**26.09**	23,603	14.90	4,916	3.10
Tennessee	174,224	5.61	449,338	14.48	522,798	16.85	195,212	6.29

Section III: Findings: Major Industry Groupings, Employment Share, and Sectoral Dependency (Continued)

Employment by Major Industry Groupings and Percent Share (2007 Q1) (Continued)

County	Enabling Industries		Education and Health Services		Amusement, Hospitality and Other services		Grand Total
	Employment	Share (%)	Employment	Share (%)	Employment	Share (%)	
Bedford	2,860	15.11	2,383	12.59	1,415	7.47	18,934
Coffee	**7,106**	**25.38**	4,920	17.57	2,617	9.35	28,000
Franklin	640	5.60	**4,203**	**36.81**	1,277	11.18	11,419
Giles	1,149	12.79	1,735	19.32	789	8.79	8,981
Hickman	212	6.16	**1,127**	**32.70**	334	9.69	3,448
Lawrence	749	6.93	**2,140**	**19.79**	1,311	12.13	10,811
Lewis	244	8.91	**755**	**27.52**	274	10.00	2,743
Lincoln	808	8.50	**2,386**	**25.10**	850	8.94	9,508
Marshall	1,109	11.63	**1,870**	**19.62**	721	7.57	9,531
Maury	6,142	18.76	**7,555**	**23.08**	3,875	11.84	32,735
Moore	40	2.76	**645**	**44.80**	71	4.93	1,440
Perry	106	4.14	**661**	**25.81**	56	2.17	2,560
Warren	1,685	12.29	2,522	18.38	1,043	7.60	13,718
Wayne	728	15.74	**1,858**	**40.20**	278	6.01	4,623
Study Region	23,579	14.88	**34,760**	**21.94**	14,911	9.41	158,450
Tennessee	577,435	18.61	**654,094**	**21.08**	382,809	12.34	3,103,318

BERC and ES202 Data

Public Administration is excluded.

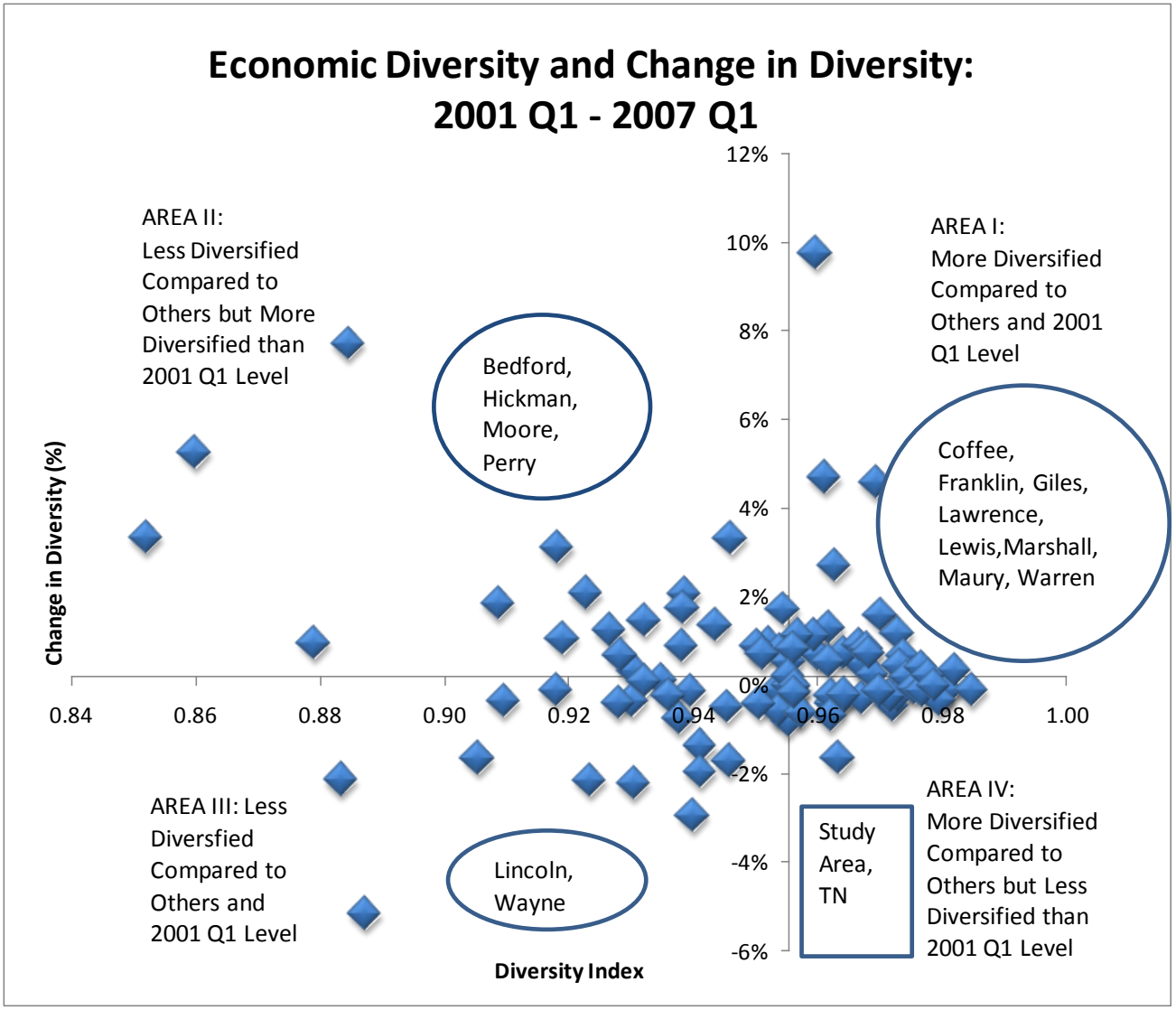
Regional Economic Diversity Based on 4-Digit NAICS (316 Industries): Rank by 2007 Q1 Diversity Index

Rank	County	Economic Diversity: 2001 Q1 Index	Economic Diversity: 2001 Q1 Number of Major Industries	Economic Diversity: 2007 Q1 Index	Economic Diversity: 2007 Q1 Number of Major Industries	Change in Economic Diversity Index (%)	Change in Economic Diversity Major Industry (%)
1	Tennessee	0.9858	70.6111	0.9848	65.6105	-0.11%	-7.08%
2	WILLIAMSON, TN	0.9788	47.1677	0.9821	55.8165	0.34%	18.34%
3	HAMILTON, TN	0.9819	55.3375	0.9807	51.8897	-0.12%	-6.23%
4	DAVIDSON, TN	0.9817	54.7522	0.9806	51.5189	-0.12%	-5.91%
5	KNOX, TN	0.9828	58.1311	0.9795	48.8047	-0.33%	-16.04%
6	**Study Area**	**0.9789**	**47.3911**	**0.9787**	**47.0025**	**-0.02%**	**-0.82%**
7	WILSON, TN	0.9758	41.3632	0.9778	44.9684	0.20%	8.72%
8	SHELBY, TN	0.9781	45.6803	0.9769	43.2589	-0.13%	-5.30%
9	SUMNER, TN	0.9729	36.9216	0.9767	42.8795	0.39%	16.14%
10	RUTHERFORD, TN	0.9762	41.9787	0.9755	40.7777	-0.07%	-2.86%
11	MONTGOMERY, TN	0.9728	36.7975	0.9744	39.0970	0.16%	6.25%
12	LOUDON, TN	0.9725	36.3920	0.9744	39.0437	0.19%	7.29%
13	**GILES, TN**	**0.9676**	**30.8563**	**0.9738**	**38.1968**	**0.64%**	**23.79%**
14	MCMINN, TN	0.9689	32.1946	0.9731	37.1991	0.43%	15.54%
15	BLOUNT, TN	0.9618	26.1455	0.9729	36.8773	1.16%	41.05%
16	CUMBERLAND, TN	0.9753	40.4694	0.9727	36.6950	-0.26%	-9.33%
17	BRADLEY, TN	0.9765	42.6182	0.9720	35.7687	-0.46%	-16.07%
18	GREENE, TN	0.9742	38.7474	0.9717	35.3035	-0.26%	-8.89%
19	HAMBLEN, TN	0.9552	22.3000	0.9701	33.4838	1.57%	50.15%
20	PUTNAM, TN	0.9714	34.9888	0.9699	33.2763	-0.15%	-4.89%
21	TIPTON, TN	0.9269	13.6739	0.9694	32.6920	4.59%	139.08%
22	GIBSON, TN	0.9666	29.9799	0.9689	32.1909	0.24%	7.37%
23	**WARREN, TN**	**0.9613**	**25.8479**	**0.9682**	**31.4696**	**0.72%**	**21.75%**
24	**LAWRENCE, TN**	**0.9601**	**25.0721**	**0.9679**	**31.1511**	**0.81%**	**24.25%**
25	CAMPBELL, TN	0.9700	33.3587	0.9670	30.3260	-0.31%	-9.09%
26	**COFFEE, TN**	**0.9622**	**26.4256**	**0.9669**	**30.2371**	**0.50%**	**14.42%**
27	DYER, TN	0.9580	23.8092	0.9667	30.0461	0.91%	26.19%
28	WASHINGTON, TN	0.9664	29.7498	0.9642	27.9578	-0.22%	-6.02%
29	DICKSON, TN	0.9573	23.4180	0.9642	27.9073	0.72%	19.17%
30	ANDERSON, TN	0.9671	30.4159	0.9639	27.7152	-0.33%	-8.88%
31	MADISON, TN	0.9794	48.5087	0.9633	27.2630	-1.64%	-43.80%
32	**MAURY, TN**	**0.9375**	**15.9988**	**0.9628**	**26.8608**	**2.70%**	**67.89%**
33	CARROLL, TN	0.9663	29.6756	0.9623	26.5041	-0.42%	-10.69%
34	CARTER, TN	0.9646	28.2661	0.9622	26.4517	-0.25%	-6.42%
35	SULLIVAN, TN	0.9686	31.8937	0.9620	26.3490	-0.68%	-17.39%
36	**FRANKLIN, TN**	**0.9494**	**19.7761**	**0.9617**	**26.1404**	**1.30%**	**32.18%**
37	WHITE, TN	0.9567	23.0952	0.9617	26.1359	0.53%	13.17%
38	OBION, TN	0.9180	12.1960	0.9611	25.7228	4.70%	110.91%
39	FENTRESS, TN	0.9535	21.5080	0.9601	25.0782	0.69%	16.60%
40	**MARSHALL, TN**	**0.8744**	**7.9603**	**0.9597**	**24.8327**	**9.76%**	**211.96%**
41	HENDERSON, TN	0.9488	19.5488	0.9594	24.6513	1.12%	26.10%
42	MONROE, TN	0.9634	27.3251	0.9573	23.4350	-0.63%	-14.24%
43	HUMPHREYS, TN	0.9463	18.6294	0.9569	23.1764	1.11%	24.41%
44	MARION, TN	0.9568	23.1395	0.9564	22.9462	-0.04%	-0.84%
45	HAYWOOD, TN	0.9580	23.8008	0.9564	22.9388	-0.16%	-3.62%
46	SEVIER, TN	0.9578	23.6777	0.9561	22.7855	-0.17%	-3.77%
47	**LEWIS, TN**	**0.9484**	**19.3872**	**0.9561**	**22.7551**	**0.80%**	**17.37%**
48	HARDIN, TN	0.9503	20.1386	0.9554	22.4233	0.53%	11.35%
49	JEFFERSON, TN	0.9554	22.4363	0.9554	22.4088	-0.01%	-0.12%
50	COCKE, TN	0.9631	27.1231	0.9553	22.3774	-0.81%	-17.50%
51	MACON, TN	0.9535	21.4906	0.9552	22.3327	0.18%	3.92%
52	CHESTER, TN	0.9385	16.2513	0.9545	21.9688	1.71%	35.18%
53	FAYETTE, TN	0.9467	18.7709	0.9540	21.7299	0.77%	15.76%
54	HAWKINS, TN	0.9594	24.6199	0.9537	21.5938	-0.59%	-12.29%
55	DECATUR, TN	0.9546	22.0264	0.9536	21.5361	-0.11%	-2.23%
56	**BEDFORD, TN**	**0.9434**	**17.6703**	**0.9522**	**20.9028**	**0.93%**	**18.29%**
57	OVERTON, TN	0.9446	18.0489	0.9512	20.4884	0.70%	13.52%
58	**LINCOLN, TN**	**0.9547**	**22.0566**	**0.9506**	**20.2449**	**-0.42%**	**-8.21%**
59	**HICKMAN, TN**	**0.9420**	**17.2430**	**0.9503**	**20.1071**	**0.88%**	**16.61%**
60	PICKETT, TN	0.9159	11.8940	0.9461	18.5462	3.29%	55.93%
61	DEKALB, TN	0.9624	26.6256	0.9458	18.4662	-1.72%	-30.64%
62	SMITH, TN	0.9502	20.0717	0.9455	18.3436	-0.49%	-8.61%
63	JOHNSON, TN	0.9309	14.4670	0.9435	17.7094	1.36%	22.41%
64	HENRY, TN	0.9600	25.0139	0.9412	17.0165	-1.96%	-31.97%
65	HARDEMAN, TI	0.9543	21.8731	0.9412	16.9971	-1.37%	-22.29%
66	WEAKLEY, TN	0.9685	31.7317	0.9399	16.6423	-2.95%	-47.55%
67	BENTON, TN	0.9409	16.9101	0.9396	16.5497	-0.14%	-2.13%
68	RHEA, TN	0.9197	12.4546	0.9386	16.2931	2.06%	30.82%
69	SEQUATCHIE, T	0.9223	12.8652	0.9383	16.2193	1.74%	26.07%
70	TROUSDALE, TI	0.9301	14.3143	0.9383	16.2077	0.88%	13.23%
71	ROBERTSON, T	0.9449	18.1559	0.9378	16.0653	-0.76%	-11.51%
72	UNION, TN	0.9383	16.1997	0.9361	15.6466	-0.23%	-3.41%
73	CLAIBORNE, TN	0.9338	15.0949	0.9348	15.3454	0.12%	1.66%
74	ROANE, TN	0.9314	14.5788	0.9322	14.7467	0.08%	1.15%
75	CLAY, TN	0.9188	12.3102	0.9322	14.7441	1.46%	19.77%
76	CROCKETT, TN	0.9276	13.8141	0.9306	14.3992	0.32%	4.24%
77	MCNAIRY, TN	0.9517	20.7044	0.9305	14.3928	-2.23%	-30.48%
78	GRAINGER, TN	0.9337	15.0759	0.9301	14.3140	-0.38%	-5.05%
79	MORGAN, TN	0.9221	12.8446	0.9283	13.9550	0.67%	8.64%
80	HOUSTON, TN	0.9318	14.6588	0.9280	13.8820	-0.41%	-5.30%
81	BLEDSOE, TN	0.9153	11.8048	0.9267	13.6365	1.24%	15.52%
82	SCOTT, TN	0.9438	17.7963	0.9235	13.0741	-2.15%	-26.53%
83	GRUNDY, TN	0.9040	10.4156	0.9228	12.9458	2.08%	24.29%
84	LAUDERDALE,	0.9096	11.0679	0.9190	12.3497	1.03%	11.58%
85	JACKSON, TN	0.8905	9.1364	0.9182	12.2228	3.10%	33.78%
86	STEWART, TN	0.9191	12.3533	0.9179	12.1875	-0.12%	-1.34%
87	POLK, TN	0.9130	11.4970	0.9096	11.0581	-0.38%	-3.82%
88	HANCOCK, TN	0.8923	9.2862	0.9087	10.9551	1.84%	17.97%
89	**WAYNE, TN**	**0.9207**	**12.6029**	**0.9054**	**10.5662**	**-1.66%**	**-16.16%**
90	CANNON, TN	0.9358	15.5747	0.8874	8.8782	-5.18%	-43.00%
91	**PERRY, TN**	**0.8213**	**5.5956**	**0.8846**	**8.6635**	**7.71%**	**54.83%**
92	CHEATHAM, TI	0.9028	10.2860	0.8835	8.5815	-2.14%	-16.57%
93	MEIGS, TN	0.6963	3.2930	0.8801	8.3419	26.39%	153.32%
94	**MOORE, TN**	**0.8709**	**7.7432**	**0.8790**	**8.2653**	**0.94%**	**6.74%**
95	VAN BUREN, TI	0.8170	5.4633	0.8599	7.1375	5.26%	30.64%
96	LAKE, TN	0.8245	5.6983	0.8520	6.7590	3.34%	18.61%
97	UNICOI, TN	0.9430	17.5568	0.8263	5.7583	-12.38%	-67.20%

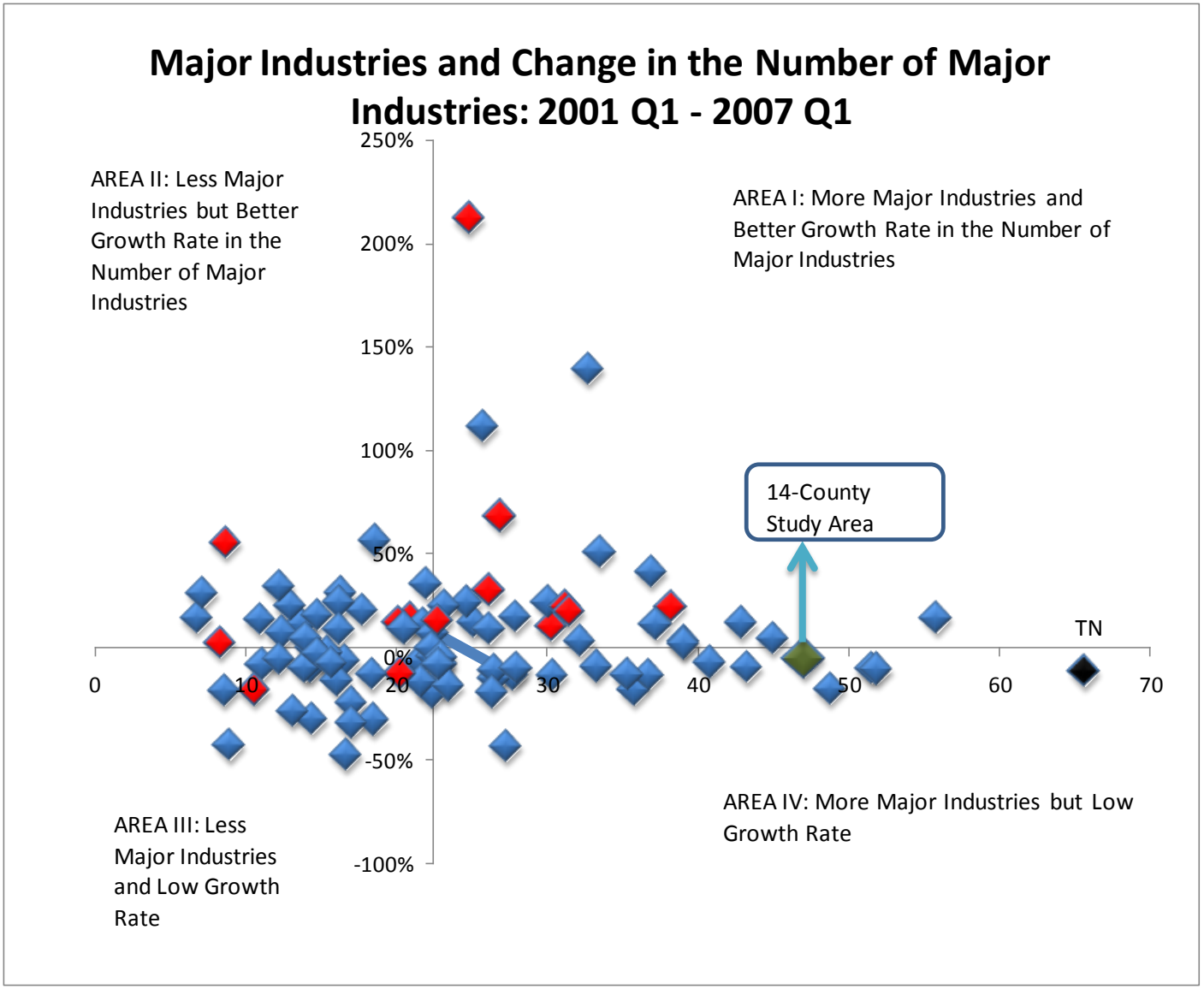
BERC Estimates Based on Deaprtment of Labor and Workforce Development ES202 Data.

Note: Diversity Index ranges from 1 to 0. The highest score of (1) indicates a highly diversified economy where each industry's employment share is similar to the others. The lowest score of (0) indicates that the economy has only one industry employing all the workers.

Section III: Diversity Index from a Comparative Perspective



Section III: Diversity Index from a Comparative Perspective



Section III: Diversity Index Sectoral Focus: Agriculture, Mining, Construction and Utilities

Agriculture, Mining, Construction and Utilities

Region	Employment Share (%)	Employment Share Rank	Effective Industry Number	Diversity Index	Explanation
Study Region	5.98	8	11.37	0.91	
Lincoln	6.15	6	11.06	0.91	
Coffee	4.51	14	9.73	0.90	Employment is relatively evenly distributed across the industries
Lawrence	5.44	12	9.23	0.89	
Giles	6.55	4	9.03	0.89	
Tennessee	5.61	10	8.82	0.89	
Maury	4.95	13	8.50	0.88	
Franklin	**6.37**	**5**	**8.34**	**0.88**	
Bedford	6.14	7	7.80	0.87	Employment is primarily
Lewis	**8.17**	**3**	**7.24**	**0.86**	concentrated in a
Hickman	**11.74**	**1**	**7.02**	**0.86**	relatively few industries
Marshall	5.49	11	6.81	0.85	out of 35 potential
Wayne	4.38	15	6.25	0.84	industries in this general
Moore	**5.95**	**9**	**5.95**	**0.83**	industry groupings
Perry	3.15	16	4.63	0.78	
Warren	**10.39**	**2**	**4.00**	**0.75**	

Red Fonts indicate possible sectoral vulnarability in these regions given the size of the industry groupings in their economies and level of concentration of employment in a few sectors out of potential 35 sectors (4-Digit NAICS industries are used).

- 4-Digit NAICS
- 35 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 9,479
- Employment share: 5.98

Section III: Diversity Index Sectoral Focus: Manufacturing

Region	Manufacturing Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	14.48	15	35.93	0.97	
Study Region	26.09	7	16.02	0.94	Employment is
Marshall	35.00	3	10.79	0.91	relatively evenly
Hickman	19.45	11	10.18	0.90	distributed across 85
Giles	30.03	4	10.04	0.90	manufacturing sectors
Lawrence	21.66	9	8.25	0.88	at 4-digit NAICS level
Franklin	19.45	12	7.86	0.87	
Coffee	**24.19**	**8**	**6.42**	**0.84**	
Lewis	8.97	16	5.83	0.83	Employment is
Warren	**29.15**	**6**	**5.67**	**0.82**	concentrated in a few
Bedford	**37.41**	**2**	**4.53**	**0.78**	sectors out of 85
Wayne	17.90	13	3.73	0.73	manufacturing sectors
Lincoln	**29.19**	**5**	**3.10**	**0.68**	posing potential
Perry	**52.54**	**1**	**2.79**	**0.64**	vulnarability to the
Maury	20.78	10	2.27	0.56	counties
Moore	15.67	14	1.23	0.19	

Given the size of the manufacturing sector in these economies, the counties with red font indicates increased sectoral vulnarability to economic downturns due to the significant concentration of employment a few sectors out of possible 85 sectors at 4-digit NAICS level.

- 4-Digit NAICS
- 85 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 41,342
- Employment share: 26.09

Section III: Diversity Index Sectoral Focus: Wholesale and Retail Trade

Wholesale and Retail Trade

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	16.85	5	21.27	0.95	Employment is relatively evenly distributed across 46 sub-sectors at 4-digit NAICS level
Study Region	14.90	8	15.17	0.93	
Maury	14.02	12	14.78	0.93	
Warren	16.65	6	13.50	0.93	
Coffee	14.10	11	12.50	0.92	
Giles	16.48	7	10.84	0.91	
Bedford	11.39	13	9.95	0.90	
Lawrence	**23.94**	**2**	**9.45**	**0.89**	Employment is concentrated in a few sectors out of potential 46 sub-sectors at 4-digit NAICS level posing scetoral vulnarability to the regional economies
Franklin	14.33	9	9.04	0.89	
Hickman	10.31	14	8.89	0.89	
Lincoln	**17.05**	**4**	**8.62**	**0.88**	
Marshall	14.28	10	8.27	0.88	
Wayne	9.88	15	6.33	0.84	
Perry	6.28	16	5.50	0.82	
Lewis	**24.30**	**1**	**4.23**	**0.76**	
Moore	**20.72**	**3**	**2.50**	**0.60**	

The counties with red fonts show critical sectoral vulnarabilities to economic shocks given the mismatch between the employment share of the sector and diversity score. This high concentration of employment in wholesale and retail employment may be due to the presence of big retail outlets.

- 4-Digit NAICS
- 46 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 23,603
- Employment share: 14.90

Section III: Diversity Index Sectoral Focus: Transportation and Warehousing

Transportation and Warehousing

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Coffee	1.19	15	4.79	0.79	
Tennessee	6.29	2	4.60	0.78	Even distribution of
Warren	2.03	10	3.29	0.70	employment across
Marshall	2.24	9	3.23	0.69	potential 29 sub-
Hickman	3.28	5	3.13	0.68	sectors at 4-digit
Perry	1.81	13	2.98	0.66	NAICS level
Franklin	1.87	12	2.94	0.66	
Giles	2.72	8	2.92	0.66	
Lincoln	1.94	11	2.69	0.63	
Study Region	3.10	6	2.63	0.62	
Maury	3.05	7	2.45	0.59	Concentration of
Wayne	1.51	14	2.34	0.57	employment in a few
Lewis	**6.21**	**3**	**1.91**	**0.48**	sub-sectors
Lawrence	**5.86**	**4**	**1.82**	**0.45**	
Bedford	**7.45**	**1**	**1.36**	**0.27**	
Moore					

The counties with red fonts have large share of their employment in this major industry groupings but the employment is concentrated in a few sub-sectors out of possible 29 sectors at 4-digit NAICS level.

- 4-Digit NAICS
- 29 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 4,916
- Employment share: 3.10

Section III: Diversity Index Sectoral Focus: Enabling (NAICS 51-56)

Enabling Industries

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	18.61	3	17.84	0.94	
Lawrence	6.93	12	14.98	0.93	Even distribution of employment across 52 sub-sectors at 4-digit NAICS level
Franklin	5.60	14	14.35	0.93	
Study Region	14.88	6	12.21	0.92	
Maury	18.76	2	10.84	0.91	
Lincoln	8.50	11	10.52	0.90	
Giles	**12.79**	**7**	**6.79**	**0.85**	
Warren	**12.29**	**8**	**6.54**	**0.85**	
Lewis	8.91	10	6.45	0.84	
Hickman	6.16	13	6.19	0.84	
Bedford	**15.11**	**5**	**5.54**	**0.82**	Concentration of employment in a few sub-sectors
Coffee	**25.38**	**1**	**5.32**	**0.81**	
Perry	4.14	15	4.00	0.75	
Marshall	**11.63**	**9**	**3.86**	**0.74**	
Moore	2.76	16	3.06	0.67	
Wayne	**15.74**	**4**	**2.47**	**0.59**	

Counties with the red fonts show the concentration of employment in a few sub-sectors out of possible 52 sub-sectors given the employment share of this industry grouping.

- 4-Digit NAICS
- 52 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 23,579
- Employment share: 14.88

Section III: Diversity Index Sectoral Focus: Education and Health Services

Education and Health Services

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	21.08	10	7.12	0.86	
Maury	23.08	8	6.01	0.83	Employment is
Franklin	36.81	3	5.30	0.81	relatively evenly
Warren	18.38	14	5.18	0.81	distributed across
Perry	25.81	6	4.93	0.80	the sub-sectors
Study Region	21.94	9	4.93	0.80	
Lincoln	25.10	7	4.61	0.78	
Lewis	**27.52**	**5**	**4.38**	**0.77**	
Giles	19.32	13	4.28	0.77	Employment is
Coffee	17.57	15	4.26	0.77	concentrated in
Bedford	12.59	16	3.50	0.71	afew sub-sectors
Lawrence	19.79	11	3.33	0.70	out of possible 25
Hickman	**32.70**	**4**	**3.03**	**0.67**	sectors at 4-digit
Moore	**44.80**	**1**	**2.51**	**0.60**	NAICS level
Wayne	**40.20**	**2**	**2.27**	**0.56**	
Marshall	19.62	12	2.05	0.51	

The countries with red fonts indicate that employment is highly concentrated in a few sectors relative to employment share of this major industry groupings.

- 4-Digit NAICS
- 25 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 34,760
- Employment share: 21.94

Section III: Diversity Index Sectoral Focus: Amusement, Hospitality and Other Services

Amusement, Hospitality and Other services

Region	Employment Share (%)	Employment Rank	Effective Number of Industries	Diversity Index	Explanation
Tennessee	12.34	1	4.98	0.80	
Maury	11.84	3	4.32	0.77	Employment is relatively evenly distributed across the possible 30 sub-sectors at 4-digit NAICS level
Franklin	11.18	4	4.00	0.75	
Coffee	9.35	8	3.82	0.74	
Giles	8.79	10	3.75	0.73	
Study Region	9.41	7	3.70	0.73	
Hickman	9.69	6	3.61	0.72	
Wayne	6.01	14	3.21	0.69	
Lawrence	**12.13**	**2**	**3.05**	**0.67**	
Bedford	7.47	13	2.85	0.65	Employment is relatively concentrated in a few sub-sectors out of possible 30 sub-sectors
Moore	4.93	15	2.82	0.65	
Lincoln	**8.94**	**9**	**2.82**	**0.64**	
Marshall	7.57	12	2.65	0.62	
Lewis	**10.00**	**5**	**2.58**	**0.61**	
Warren	7.60	11	2.53	0.60	
Perry	2.17	16	1.94	0.49	

Lawrence, Lewis and Lincoln counties have relatively large share of employment in this industry groupings but their employment is highly concentrated in a few sectors out of possible 30 sub-sectors.

- 4-Digit NAICS
- 30 Sub-Sectors within this group
- Ranked by diversity index
- Employment in the study region: 14,911
- Employment share: 9.41

Section IV: Conclusion

- Study findings suggest that individual counties have relatively better economic diversity scores than other counties in Tennessee.
- Combining 14 counties improve diversity score for the region dramatically suggesting that industries in the region complementary industries.
- Diversity Index by major industry groupings further reinforce the fact that county economies in the region complement each other.
- Individual counties, however, have very low diversity scores by major industry groupings.

Thank You!

Questions?

Workforce Dynamics in Middle Tennessee Marketing Region

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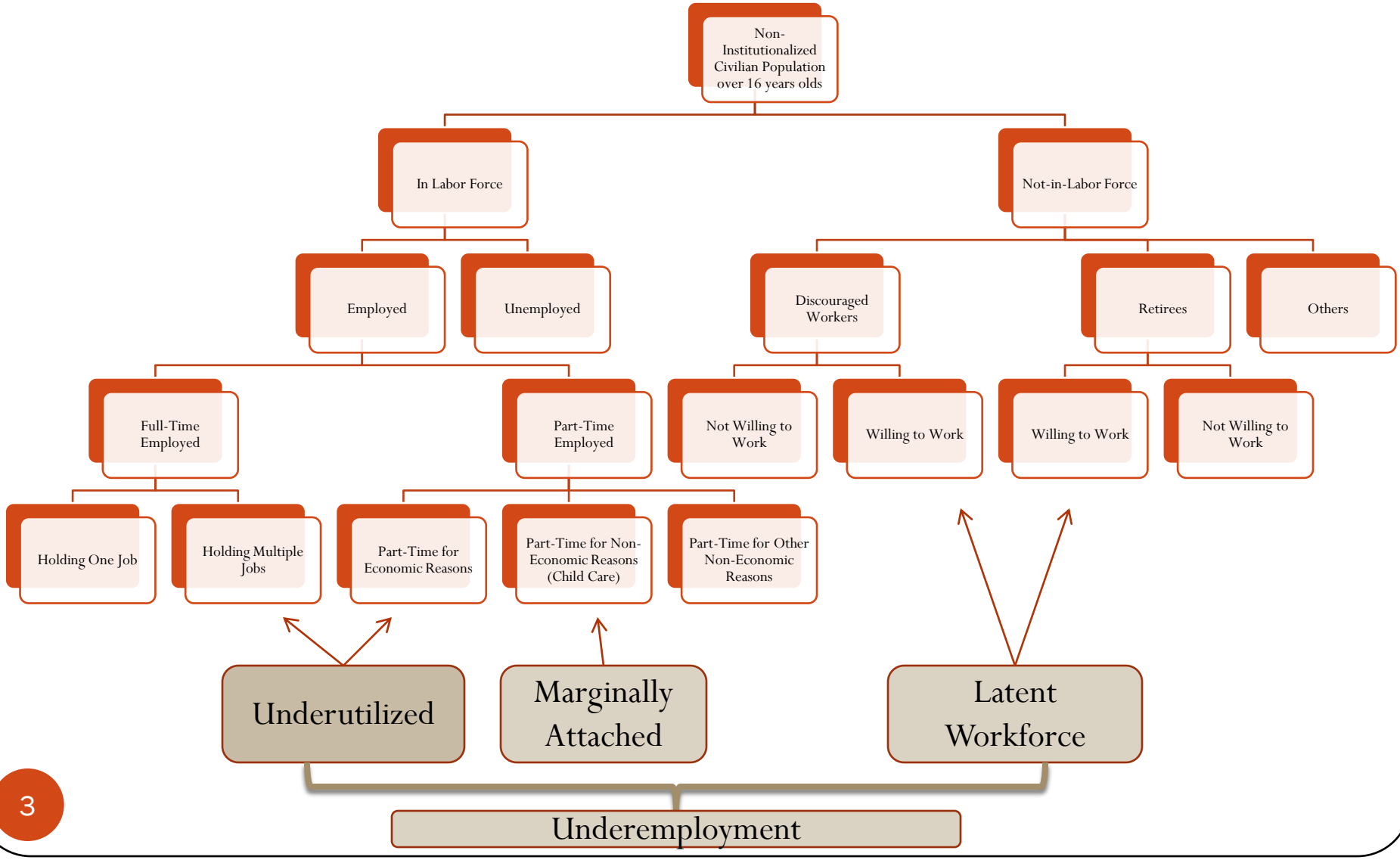
Section I: Overview

- A necessary component of a target industry analysis is to estimate available workforce in the region.
- Official unemployment rates do not often represent the actual workforce dynamics.
- The survey-based research in neighboring states (Kentucky and Alabama) shows that there are substantial number of workers who are currently employed but "underutilized" due to economic reasons, skill-mismatch and others.
  - According to these studies, "underemployment" is often between 15 and 40 percent of workforce in Alabama and Kentucky counties.
- In addition to "underemployment," there are also discouraged workers and retirees who are willing to work.
- In the absence of the survey data, this study imputes underemployment in the study area from the state level determinants of underemployment.

Section II: Concept of Underemployment



Section III: Methodology

- State level "underemployment rates" are estimated from Current Population Survey (October 2007) for 50 states and District of Columbia.
- BERC collected a set of socioeconomic indicators for each states that may be used as determinants of underemployment.
  - BERC used the survey-based studies conducted in the U.S. to identify the characteristics of underemployed.
  - At the state level, BERC then used a subset of available data that may be considered proxies to the individual level characteristics.
- BERC used OLS regression analysis to identify the determinants of state level underemployment rates.
- BERC then used the coefficients from this regression analysis to impute county-level underemployment estimates in the study area. Data used in this analysis is presented in the appendix.
- The results obtained through this method provide a conservative estimates of the underemployment in the region.
- A comprehensive survey is necessary to understand the extent of underemployment in the region

Section IV: Findings

- Findings suggest that "underemployment" rate in the region is nearly 10 percent.
  - This is in addition to 6.47 percent unemployment rate in the region. A word of caution: these two figures should not be added together as they are completely different constructs.
- As of 2006, there were 13,634 unemployed workforce seeking jobs in the region.
- With additional 20,575 underemployed individuals, total available labor pool increases to 34,209 people.
- The following tables present the issue from different perspectives.

Section IV: Findings (Continued): Available Labor Pool

Available Labor Pool in Southern Middle Tennessee Counties: Employment, Unemployment, and Underemployment**

Counties	Labor Force	Employed	Unemployed	Underemployed	Unemployment Rate	Underemployment Rate
Bedford	22,114	20,970	1,144	2,099	5.2	9.49
Coffee	25,478	24,086	1,392	3,349	5.5	13.15
Franklin	20,087	18,942	1,145	1,088	5.7	5.42
Giles	13,471	12,513	958	1,303	7.1	9.67
Hickman	10,415	9,860	555	0	5.3	0.00
Lawrence	16,899	14,990	1,909	902	11.3	5.34
Lewis	5,244	4,869	375	178	7.2	3.40
Lincoln	17,047	16,331	716	1,346	4.2	7.90
Marshall	12,649	11,854	795	1,729	6.3	13.67
Maury	36,422	34,451	1,971	5,920	5.4	16.25
Moore	3,125	2,978	147	20	4.7	0.64
Perry	3,350	3,131	219	86	6.5	2.58
Warren	18,031	16,405	1,626	1,955	9	10.84
Wayne	6,539	5,857	682	599	10.4	9.16
Southern Middle Tennessee	210,871	197,237	13,634	20,575	6.47	9.76

BERC and Current Population Survey (October 2007)

**Imputed from state level indicators using OLS regression analysis (see appendix for technical details).

Section IV: Findings (Continued): Components of Underemployment Used in This Study

Components of "Underemployment"* Estimated from Averages of States Using Current Population Survey (October 2007)

Counties	Components of Underemployment					Latent Workforce**	
	FT but part-time for economic reasons	PT and usually PT for economic reasons	Not at work, Usually Part-Time	FT holding multiple jobs	Marginally attached-childcare problems	Discouraged worker and retired -not in the labor force but interested in working	Total "Underemployment"
Bedford	166	305	167	899	73	490	2,099
Coffee	265	486	266	1,434	117	781	3,349
Franklin	86	158	86	466	38	254	1,088
Giles	103	189	104	558	45	304	1,303
Hickman	0	0	0	0	0	0	0
Lawrence	71	131	72	386	31	210	902
Lewis	14	26	14	76	6	42	178
Lincoln	107	195	107	577	47	314	1,346
Marshall	137	251	137	740	60	403	1,729
Maury	469	859	470	2,535	206	1,381	5,920
Moore	2	3	2	9	1	5	20
Perry	7	13	7	37	3	20	86
Warren	155	284	155	837	68	456	1,955
Wayne	47	87	48	256	21	140	599
Southern Middle Tennessee	1,629	2,985	1,635	8,811	717	4,799	20,575

BERC and Current Population Survey (October 2007).

*Underemployment reported here includes five (5) different labor force-related constructs: (1) Part of the civilian labor force but employed part-time for economic reasons (underutilized), (2) part of the civilian labor force but employed part-time due to child care needs (marginally attached), (3) part of the civilian labor force and employed full-time but holds multiple jobs, (4) not in the civilian labor force and not looking for job but interested in working (discouraged workers/latent workforce), and (5) not in the civilian labor force due to retirement but interested in working (latent workforce).

**Concept of latent workforce refers to those individuals who are not in the civilian labor force due to discouragement, retirement, disability, and other reasons but indicated that they consider working full-time or part-time.

Section IV: Findings (Continued): Revised Labor Force Estimates Based on the Findings

Revised Labor Force Data: Total Available Labor Pool

Counties	Labor Force	Latent Workforce*	Revised Labor Force	Unemployed	Employed But Underutilized	Not in Labor Force But Interested in Working	Available Labor Pool	Percent of Revised Labor Force**
Bedford	22,114	490	22,604	1,144	1,610	490	3,243	14.35
Coffee	25,478	781	26,259	1,392	2,568	781	4,741	18.06
Franklin	20,087	254	20,341	1,145	834	254	2,233	10.98
Giles	13,471	304	13,775	958	999	304	2,261	16.41
Hickman	10,415	0	10,415	555	0	0	555	5.33
Lawrence	16,899	210	17,109	1,909	692	210	2,811	16.43
Lewis	5,244	42	5,286	375	137	42	553	10.47
Lincoln	17,047	314	17,361	716	1,032	314	2,062	11.88
Marshall	12,649	403	13,052	795	1,326	403	2,524	19.34
Maury	36,422	1,381	37,803	1,971	4,539	1,381	7,891	20.87
Moore	3,125	5	3,130	147	15	5	167	5.34
Perry	3,350	20	3,370	219	66	20	305	9.06
Warren	18,031	456	18,487	1,626	1,499	456	3,581	19.37
Wayne	6,539	140	6,679	682	459	140	1,281	19.18
Southern Middle Tennessee	210,871	4,799	215,670	13,634	15,776	4,799	34,209	15.86

*Latent labor force includes those individuals who are not in the civilian labor force but interested in working part-time or full-time.

**Available labor pool as percent of revised labor force is imputed from the state level OLS regression. Survey data in neighboring states (Alabama and Kentucky) suggests that these percentages represent the minimum rate of available labor pool.

Including "latent workforce" as defined here increases the labor force from 210,871 to 215,670

Section V: Appendix

Appendix A: State Level Determinants of Underemployment: Regression Results

Dependent Variable: Underemployment Rate (%) (October 2007)

Variables	Parameter Estimate	Standard Error	t Value	Pr >|t|
Intercept	-8.508	69.042	-0.120	0.903
Population ages 15-24 (%)	0.548	0.640	0.860	0.398
Population ages 25-44 (%)	0.579	0.397	1.460	0.154
Population ages 45-64 (%)	0.138	0.408	0.340	0.737
Whites (%)	-0.011	0.049	-0.230	0.823
Blacks (%)	-0.023	0.077	-0.300	0.769
Hispanics (%)	-0.011	0.066	-0.170	0.869
Female (%)	-0.800	1.139	-0.700	0.487
Farm, Agricultural, and Mining (Employment, %)	0.296	0.302	0.980	0.335
Construction (Employment, %)	-0.150	0.656	-0.230	0.821
Manufacturing (Employment, %)	0.309	0.152	2.030	0.051
TCPU (Employment, %)*	0.318	0.429	0.740	0.465
Wholesale (Employment, %)	-0.408	0.561	-0.730	0.473
FIRE (Employment, %)**	-0.373	0.255	-1.460	0.154
Retail (Employment, %)	1.213	0.482	2.510	0.017
Unemployment Rate (%)	-0.586	0.374	-1.570	0.127
Households Income Under $20K (%)	0.211	0.179	1.180	0.248
Wage (Average)	0.000	0.000	2.880	0.007
HSNHS/COL*** (Ratio)	-0.490	0.844	-0.580	0.566

R-Square: 0.471

Data Source: Underemployment Rate is calculated from Current Population Survey for 50 States and District of Columbia. All Other Variables are from Census, BLS, BEA, and Woods and Poole 2007.

*Transportation, Communications and Public Utilities.

**Finance, Insurance and Real Estate

***Ratio of percent of people over 25 with high school and less than high school education over percent of people with some college and above education.

Section V: Appendix

Appendix B: County Socioeconomic Indicators Used for Calculating Underemployment Rate (2006)

County Indicators	Bedford	Coffee	Franklin	Giles	Hickman	Lawrence	Lewis	Lincoln	Marshall	Maury	Moore	Perry	Warren	Wayne
Population ages 15-24 (%)	13.03	12.51	15.01	13.47	12.59	13.10	12.85	12.77	12.85	13.23	12.92	13.12	12.06	12.77
Population ages 25-44 (%)	31.22	27.70	25.82	25.97	30.76	27.21	26.83	26.68	29.00	28.59	27.22	24.74	29.30	32.24
Population ages 45-64 (%)	23.56	25.45	26.72	27.73	25.44	24.52	26.80	26.87	26.98	26.71	28.14	27.61	25.39	25.73
Whites (%)	78.51	91.69	91.45	86.67	93.59	96.48	96.51	90.01	88.33	81.40	95.50	95.78	89.02	91.34
Blacks (%)	7.89	3.65	5.62	11.44	4.43	1.59	1.74	7.07	7.53	13.24	3.44	2.86	3.18	7.23
Hispanics (%)	12.21	3.43	2.05	1.06	1.33	1.31	1.24	1.85	3.72	4.44	0.74	1.16	6.96	0.91
Female (%)	49.95	51.27	51.11	51.16	47.04	51.35	50.53	51.23	50.59	50.93	49.65	50.33	50.20	44.47
Farm, Agricultural, and Mining (Employment, %)	8.10	5.00	10.00	14.00	13.00	11.00	8.00	15.00	10.00	5.00	20.00	8.00	15.00	15.00
Construction (Employment, %)	7.06	5.94	7.10	5.30	12.76	5.86	8.33	5.94	4.61	4.58	3.13	4.71	4.22	3.04
Manufacturing (Employment, %)	27.07	17.16	12.38	20.77	10.58	17.44	11.49	19.69	36.32	18.01	12.61	36.13	29.11	17.39
TCPU (Employment, %)*	3.48	2.31	3.08	3.01	3.80	4.56	4.65	2.20	5.04	4.11	1.89	2.83	3.89	2.07
Wholesale (Employment, %)	2.15	2.93	2.27	2.71	2.23	4.91	3.56	3.20	1.16	2.62	1.74	1.28	4.39	1.57
FIRE (Employment, %)**	5.42	4.63	5.60	5.18	5.55	4.61	6.64	4.19	4.73	6.17	13.08	4.29	3.74	3.91
Unemployment Rate (%)	5.30	5.55	5.80	7.26	5.47	11.77	7.31	4.23	6.46	5.58	4.74	6.66	9.42	10.92
Households Income Under $20K (%)	21.69	25.00	24.00	24.00	27.00	27.00	27.00	26.00	23.00	20.00	20.00	30.00	31.00	32.00
HSNHS/COL*** (Ratio)	7.99	4.72	5.52	8.48	14.01	10.52	10.81	7.40	8.40	6.34	7.47	13.04	9.95	11.44
Retail (Employment, %)	11.75	18.41	14.96	16.43	9.71	18.07	17.66	14.27	13.13	15.85	9.81	8.75	13.00	11.96
Wage (Average)	$23,531	$25,041	$17,904	$21,110	$15,254	$18,664	$15,943	$17,759	$22,688	$38,413	$19,888	$19,196	$23,233	$17,315
Underemployment Rate (%)****	9.49	13.15	5.42	9.67	0.00	5.34	3.40	7.90	13.67	16.25	0.64	2.58	10.84	9.16

Data Source: All Variables (Except Underemployment Rate) are from Census, BLS, BEA, and Woods and Poole 2007.

*Transportation, Communications and Public Utilities.

**Finance, Insurance and Real Estate

***Ratio of percent of people over 25 with high school and less than high school education over percent of people with some college and above education.

****Underemployment Rate is imputed from the state OLS regression coefficients in Appendix A.

Thank You!

Questions?

Business Interview Results

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Section I: Overview

- Business Interview Procedure includes the following steps
  - BERC staff called 124 businesses and 28 local officials to schedule an interview
  - The process took more than three (3) months from the late January to the mid-April
  - Length of survey varied between 30 minutes to 120 minutes depending on circumstances and issues involved as well as willingness of businesses to expand certain pressing issues
  - Final results are:
    - 50 interviews were conducted
      - 21 Economic Development and Elected Officials
      - 29 Businesses

Section I: Overview: Distribution of Interviews by County

BI1. Distribution of Interviews by County

County	Percent (%)
Bedford	18
Coffee	18
Franklin	8
Giles	4
Hickman	6
Lawrence	8
Lewis	6
Lincoln	4
Marshall	6
Moore	2
Maury	8
Perry	2
Warren	6
Wayne	4
Total Interviews (N)	50

MTSU Business Interviews

- All 14 counties are represented
- Interviews represent a diverse group of businesses from agribusinesses to automotive suppliers

Section II: Economic History of Region

- Traditional manufacturing industries have ended their half-century presence in the region, affecting all aspects of life
  - Currently, still companies are leaving
  - Nearly 10,000 jobs lost in the last decade
  - NAFTA triggered the losses
  - Outflow was massive
- While certain businesses have relocated, the ones remaining here are losing customers and their businesses are shrinking
- A notable observation is that branch operations are closing creating a negative local sentiment against branch operation

Section II: Economic History of Region: Impact of Overseas Competition

- International competition made the largest companies shut down
  - In certain instances, local companies were purchased and eliminated
- Critical aspect of international competition is that companies located overseas do not face same regulatory environment and cost structure the companies are facing here
  - Cheap labor and low environmental standards have made the companies here less competitive
- Implications of these processes are that
  - Farms are consolidated
  - Decent paying manufacturing jobs gone
  - Existing businesses are feeling squeezed and uneasy

Section II: Economic History of Region: Which Companies have Survived?

- Those companies diversifying their product lines
- Companies heavily invested in technology and new products
- Those companies upgrading their manufacturing technologies, but at the expense of some job losses
- Those companies operating in healthcare niche markets
- Those companies producing hazardous materials and subject to extensive regulations but at the expense of significant loss in productivity
- Those companies investing in their employees and in the region

Section III: Current Business Environment

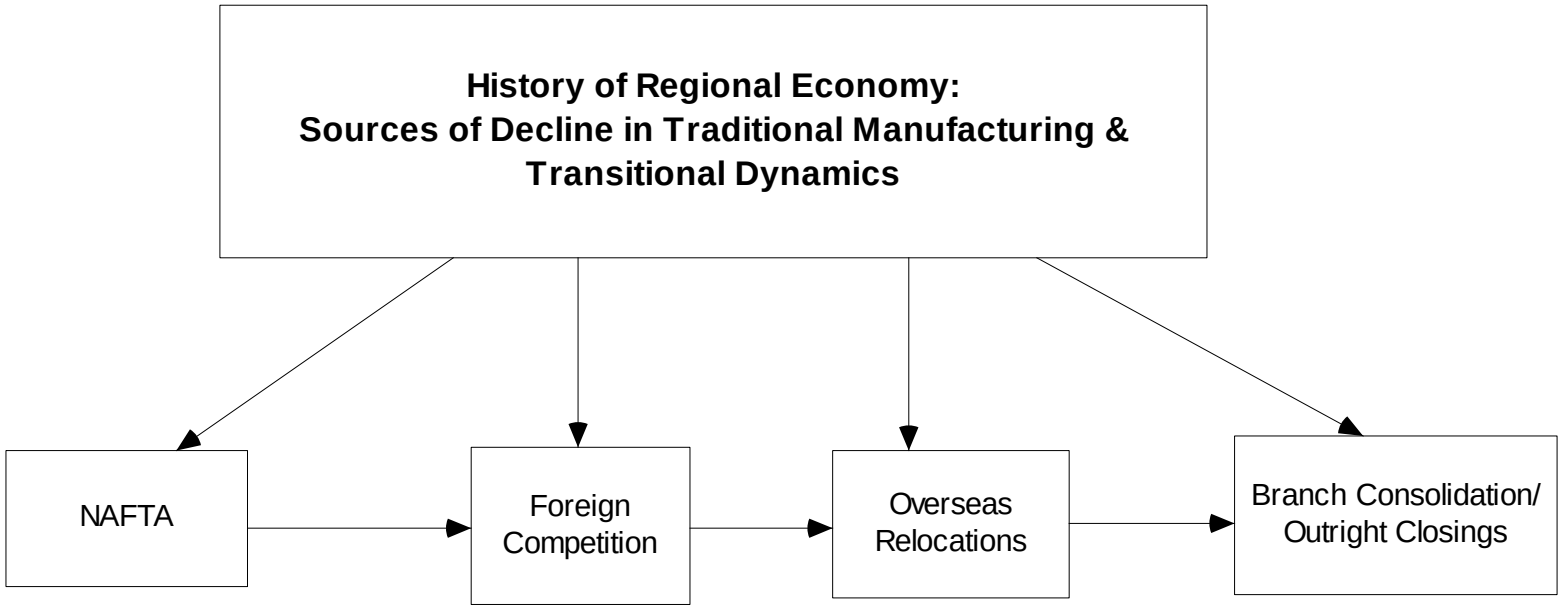
- The region is still in transition
  - Everyday, it is possible to hear a new announcement of plant closing in the region
- Subprime meltdown and accompanying financial crisis affecting all businesses
- However, increasing energy prices and raw material costs affecting overseas competition's impact on area businesses
  - This creates a window of opportunity for area businesses to recapture certain lost businesses
- Quality concerns of imported goods helped area businesses to a certain extent
- Increasing cost of doing businesses in overseas markets is likely to help local businesses

Section III: Current Business Environment/Transitions

- Before analyzing current challenges, lets summarize transitional dynamics in business environment in the region
- As we see in the next chart, NAFTA triggered the whole process, then competition from China intensified, creating massive outflows of companies to overseas as well as branch consolidation and outright plant closings
- In terms of transitional dynamics, there have been multiple dynamics at work, generating increasing tensions in rural counties but also opportunities to reinvent themselves provided that they have necessary funding

Section III: Current Business Environment/Transitions

Chart IV.2: Transitional Dynamics in MTM Region: Interviews



Transitional Dynamics

Labor Intensive	Technology Intensive
Textile and Apperal	Automative
Heavily Subsidized Low Wage	High-Tech High Paying
Low Skilled Manufacturing	High Skilled Technology
Big Companies	Small and Medium Size
Traditional Manufacturing	Lean Manufacturing
Low Productivity	High Productivity
Single Product Assemply Line	Diversified Product
Branch Operation	Integrated Plant Operation

Section III: Current Business Environment/ Transitions and Tensions

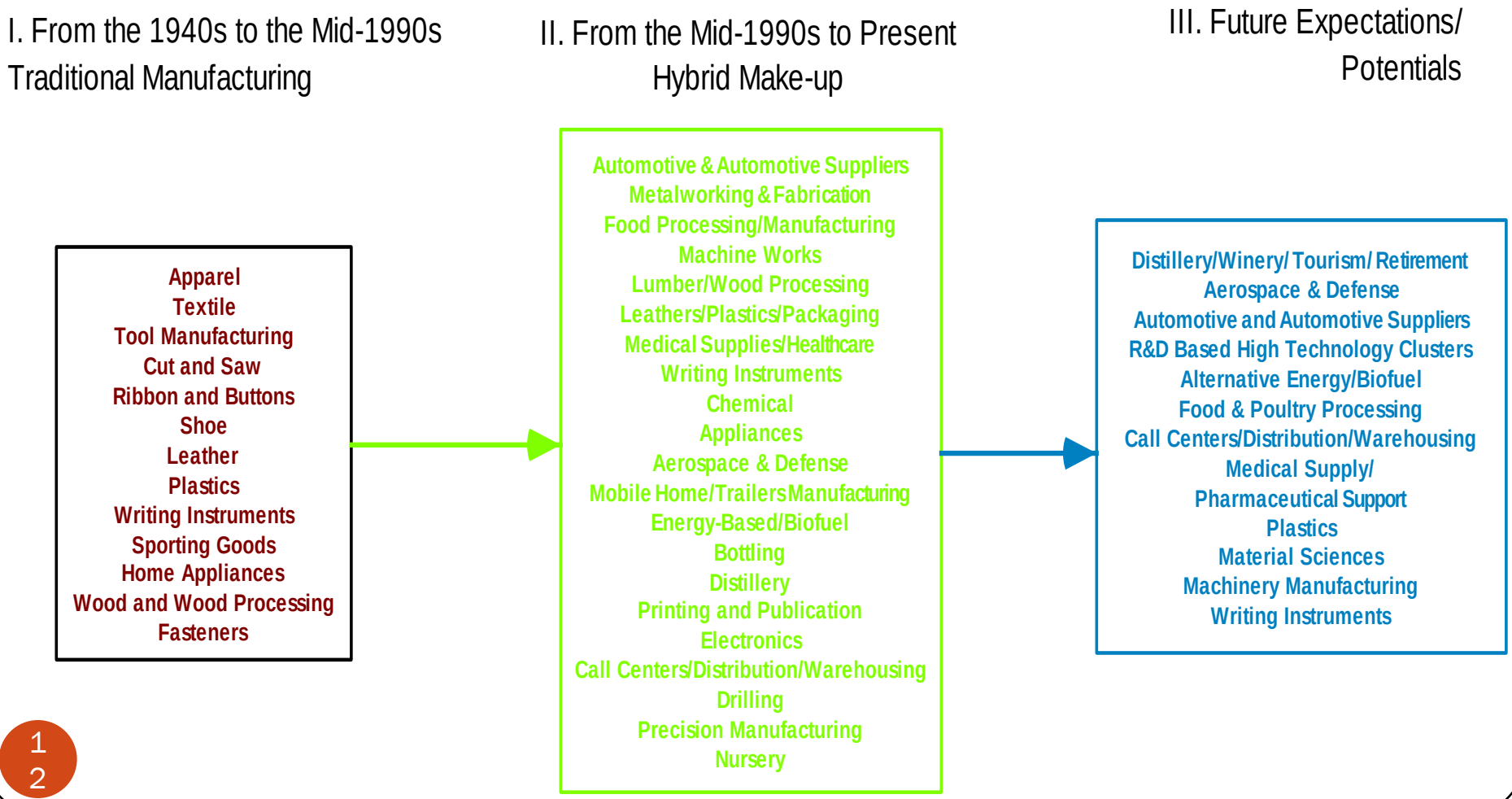
- While there have been ongoing transitions in local business environment, local business leaders have specific concerns about current environment and business practices
  - Concern about too much emphasis on automotive
  - Concern about too much emphasis on "big businesses;" many believe that the region's future is in small to medium size businesses
- Many business leaders believe region has a big potential for growths but have the following recommendations for the regional competitiveness:
  - Focus on how to stay competitive regionally
  - Increase highway capacity
  - Develop aggressive business strategy to market the area regionally
  - Connect region to AL; need to make a fresh start in defense industry
  - Institute new policies to help small businesses; they are engines of economic growth, and current job creation incentives are not practical for them
  - Emphasize "lean manufacturing" and centers for manufacturing excellences; productivity increase and technology investment are key to our future
  - Build up regional technical resources

Section IV: Past, Present, and Future of Industry Clusters in the Region

- The region has experienced a shift in manufacturing employment
  - Shift from traditional manufacturing that dominated the period between the early 1940s and the mid-1990s
  - Current environment represents the remnants of past industries plus heavy automotive industries: a hybrid system
  - Future is likely to be dominated by service industries, automotive, defense-related and bio-fuel, according to interview results
- The following chart summarizes this process

Chart IV.3:

Historical Evolution of Regional Economy: From Traditional Manufacturing to High Tech Defense and Service Industries



Section V: Current Industry Clusters

- 100 sound bites from 50 business and community leaders identified the current industry clusters in the region as presented in Table BI2
  - Automotive and automotive suppliers top the list
  - Metalworking & fabrication, food processing, and machine works constitute next group of clusters
  - The third group includes the group of clusters that includes lumber/wood processing, leather/plastics/packaging, medical supplies/healthcare
  - The fourth major group includes writing instruments, chemical and appliances

BI2. Current Industry Clusters (ranked by the number of frequency)

Clusters	Percent Cited (%)
Automotive & Automotive Suppliers	17
Metalworking & Fabrication	9
Food Processing/Manufacturing	8
Machine Works	8
Lumber/Wood Processing	7
Leathers/Plastics/Packaging	7
Medical Supplies/Healthcare	6
Writing Instruments	5
Chemical	5
Appliances	5
Aerospace & Defense	4
Mobile Home/Trailers Manufacturing	3
Energy-Based/Biofuel	3
Bottling	2
Distillery	2
Printing and Publication	2
Electronics	2
Call Centers/Distribution/Warehousing	2
Drilling	1
Precision Manufacturing	1
Nursery	1

MTSU Interview

Section V: Current Industry Clusters: How are They Performing?

- Observation about the business environment
  - Pretty stable business environment
  - Region is good place to do business
  - Regional environment is good for businesses
- Issues and concerns about regional business environment
  - Region needs fast-track program activation
  - The region is producing less and less
  - High automotive concentration creates weakness
  - Property tax on equipment further eroding already thin margins
- National economic trends and concerns
  - High competition
  - Increasing material costs and energy prices: regional supplier industries feeling squeezed as the cost of production increases but they cannot increase their prices due to customer industries' resistance
  - Housing downturn affected lumber and wood processing industries
  - Relocation of businesses overseas has shrunk certain industries due to the loss of customer industries

Section V: Current Industry Clusters: How are They Performing?

- Industries that are stable, doing OK and growing
  - Automotive due to automation
  - Plastics and packaging
  - Distillery
  - Metal fabrication
  - Niche markets: explosive manufacturing
  - Agribusiness
  - Injection molding
  - Lumber and logging
  - Traditional manufacturing with government contracts
- Industries that are not performing well
  - Small businesses are struggling because of increasing material costs
  - Automotive suppliers are feeling squeezed
  - Air conditioning and fabricated metal are feeling squeezed
  - Margin for writing instruments are razor thin and they are very slow
- Overall, half of businesses are experiencing low to moderate growth rate

Section V: Current Industry Clusters: What are the current challenges industry face?

BI3. Challenges for Current Industry Clusters

Challenges	Percent cited (%)
All aspects of workforce	19.07
lack of technical skill	
availability and quality	
shortages	
skills	
math and science skill	
Cost of doing business	11.86
raw materials	
energy	
utility	
logistics	
International Competition	11.34
China, NAFTA, Others	
Workers comp for small businesses	7.73
Healthcare	4.64
Work ethic	4.12
FMLA abuse	
turnover	
commitment	
General economic environment	3.61
4-Lane highway	3.61
Retaining existing businesses	3.09
incentives	
grants for tech investment	
small business incentive packages	

Challenges	Percent cited (%)
Local funding challenges to expand services (infrastructure)	2.58
State red tape	2.58
Failure of secondary school system	2.58
Water supply/waste water treatment	2.58
Tax (local, personal, corporate) & abatement	2.06
Education	2.06
Unemployment & underemployment	2.06
County-centric thinking	1.55
Environmental regulations	1.55
Transportation/supply cost	1.55
TVA rate increase	1.03
Broadband accessibility	1.03
Retail leakage/less shopping opportunities	1.03
Union mindset	1.03
Getting defense contracts for companies	0.52
Business friendly attitude	0.52
Rural and remote	0.52
Local leadership (not coming together to face challenges)	0.52
Economic leadership	0.52
Not availability of high paying jobs for area graduates	0.52
Loss of customer base to overseas	0.52
Consolidation of branch operations	0.52
Decent rail services	0.52
New generation employee turnover	0.52
Regional marketing	0.52

MTSU Interview Results

Section V: Current Industry Clusters: What do the industry leaders think about these challenges?

- Leveling the playing field is a must to offset the impact of international competition
  - Quality of imports should be carefully scrutinized
- "Just-in-time" manufacturing is critically important, and the counties in the region need 4-lane highway to become "just-in-time" supply centers
  - Local governments are struggling to complete projects
- State red tape is a major challenge for businesses and must be eliminated
- Small businesses are paying hefty prices for increasing utility costs
- Leadership should make sure the foundation is strong and reduce the chances of further employment losses from the rural areas
- The work we do does not require advanced education but new generation does not have a basic math skill
- Non-traditional technical schools are absolutely necessary to address business needs
- Economic development officials' attitude must change; their concerns are adding more jobs, but our concern is about surviving and sustaining
- Counties need to work together to address water, transportation, regional park infrastructure and skilled workforce issues
- Policies for existing businesses are urgently needed
  - New legislation that gives incentives for companies expanding in rural areas is necessary
- The region is in the middle of high-tech corridor that should be leveraged

Section V: Current Industry Clusters: What should be done to be more competitive?

BI4. What can be done to remain competitive?

Suggestions	Percent cited (%)
Improving education and educating workforce	11.69
Reduce the healthcare cost	6.49
Prioritizing existing business needs (small & rural areas)	6.49
Lean manufacturing-university connection	6.49
Addressing workforce skills/work ethic	6.49
Diversifying products and economy	5.19
Becoming/making your business more competitive	5.19
Legislation that levels the playing field with NAFTA and China	5.19
One stop regional workforce training and business centers	5.19
Cutting the corporate taxes/ personal tax on unassembled equipment	3.90
Set up a "non-traditional technical school"	3.90
Make workers comp small business friendly	2.60
Empowering employees & leveraging their creativity	2.60
Expanding the highway	2.60
Improving community support for businesses	2.60
Cooperation across the counties/regional focus	2.60
Encourage existing businesses to invest in the area	2.60
reward integrated business systems with tax incentives	

Suggestions	Percent cited (%)
Taking advantage of NAFTA to sell there	1.30
Eliminating middle man/buying your own	1.30
Promoting college education	1.30
Being competitive in labor insurance and utilities	1.30
Hazardous material shipping regulations	1.30
Connect local suppliers to customers	1.30
Ease of getting through state red tape	1.30
Municipal waste water treatment facility	1.30
National level focus on competitiveness and education	1.30
Utility cost must be addressed for small businesses to remain competitive	1.30
We need to have an energy policy	1.30
Revamping incentive package to accommodate small businesses	1.30
Leadership should take advantage of available federal money for	1.30
workforce development	
existing industry retention programs	
lean manufacturing	
Bring research and testing labs to the area	1.30

MTSU Interview Results

Section VI: Future/Potential Industry Clusters: What are they?

- Businesses and community leaders mentioned distillery/winery/tourism/ retirement development as potential clusters
- Aerospace and defense as well as automotive and its suppliers as the second and third clusters
- R&D based high technology industries and alternative energy were also received high rankings

BI5. Future Clusters/Potential

Clusters	Percent (%)
Distillery/Winery/ Tourism/ Retirement	21.52
Aerospace & Defense	15.19
Automotive and Automotive Suppliers	15.19
R&D Based High Technology Clusters	10.13
Alternative Energy/Biofuel	8.86
Food & Poultry Processing	7.59
Call Centers/Distribution/Warehousing	5.06
Medical Supply/Pharmaceutical Support	5.06
Plastics	3.80
Material Sciences	2.53
Machinery Manufacturing	2.53
Writing Instruments	2.53

MTSU Interview Results

Section VI: Future/Potential Industry Clusters: How do the business and community leaders see the future?

- Overwhelming number of them indicated that region has potential for growth
  - But they indicated that core manufacturing industry will continue to decline
- Similarly, they mentioned that the region is great for business to start and grow as well as raise family
  - However, the existing business feels that if the things continue to be the way they are we may not be in business in the near future
- The region is strategically located to grow and attract new businesses
  - However, we need to be ready in terms of industrial sites and workforce education
- We cannot afford to lose our manufacturing capabilities
  - Community and government should realize that losing manufacturing ability will decrease our quality of life and standard of living
- Regional effort is critical for the future growth
  - The region must carefully decide what kinds of clusters they will attract given the available resources
- We need to diversify and adapt the market conditions to remain competitive
- Growth will come from technology and innovations
  - Existing business will play critical role

Section VI: Future/Potential Industry Clusters: How do the business and community leaders see the future?

- Arnold-Huntsville cooperation should be pursued vigorously, and spill over effect of this cooperation across the rural counties should be explored
- TVA would be more cooperative in rural areas
- Entrepreneurship and small businesses will be the engine of region's economy
- Integrated plant system rather than branch operation will be critically important for the sustainable economic growth

Section VI: Future/Potential Industry Clusters: What are the future challenges?

- All aspects of workforce tops the list as the critical challenge the region will face as its economy continues to transform itself.

BI6. Future Challenges

Challenge	Percent cited (%)	Challenge	Percent cited (%)
Improving all aspects of workforce	19.47	Diversification	2.65
Local education/resistance to tech education	8.85	Water availability/treatment	2.65
Bringing communities together around a common goal	7.08	Thinking and acting regionally	2.65
Foreign competition	6.19	Addressing energy cost	1.77
Infrastructure in rural areas/funding	4.42	Price increase	1.77
Open mindedness/cooperation among leaders	4.42	Lack of incentives for rural areas/small businesses	1.77
Shipping/transportation	4.42	Training programs for welding, injection molding and other technical areas	1.77
Highway/4-lane access	3.54	Airport access	0.88
Healthcare	3.54	Technical resources	0.88
Red tape/regulations	3.54	Regional emphasis on education, workforce, highway	0.88
Leadership in promoting and selling the region by leveraging exiting industries	3.54	Increasing efficiency in water and energy use	0.88
Broadband access	2.65	Preparing workforce for potential technical skill shortages due to baby boomers	0.88
Heavy reliance on automotive	2.65	Advance manufacturing development programs are critical	0.88
Lack of R&D supported by universities	2.65		
Workers comp	2.65		

MTSU Interview Results

Section VII: What is the state of business-to-business interactions in the region?

- Nearly one-third of businesses and community leaders rated the business interaction below average; less than 17 percent as above average; and 27 percent believe more need to be done

BI7. What is the state of business to business interaction in the region?

Categories	Percent cited (%)
Little/No Interaction	18.75
Not Good	14.58
Average	10.42
Above Average	16.67
Could be better	27.08
HR Directors and Plant Managers Meeting	12.50

MTSU Interview Results

Section VII: What are the critical issues in business-to-business interactions in the region?

- We need to foster a healthy regional business environment, regionalism itself and regional workforce development
  - Regional business expos and synergy must be encouraged
  - Need better synergy at the regional level between businesses, industrial boards, chambers, educational institutions and government
- Local chambers and mayors need to know their communities better
  - They need to work hard and visit businesses
- Relations with outside business associations are better than the ones with the area businesses
  - Social organizations are not there
  - Some companies are more detached
  - Management of companies is not living in the area
  - Community culture is not strong
  - Some businesses do not want to interact with each other
  - Businesses are not cooperating with each other
- Networking is critical for business success
  - It is desirable to have close cooperation in the area of education
  - There should be a new initiation of business to business meetings to pool resources in lean manufacturing areas
  - Small businesses need to come together

Section VII: What are the state of business to education interactions in the region?

- Overall, business and community leaders indicate a positive interaction with schools. However, they continue to acknowledge that
  - Education is a sore point
  - County could benefit from new educational opportunities
  - Small companies do not have close interaction

BI8. Business to Education Relationships

Categories	Percent cited (%)
Business to vocational school is good	3.33
Businesses done a good job in cooperating with educational institutions	43.33
There are close contacts with technology centers	13.33
Community college is doing good at training	6.67
Could be better	16.67
Limited/no interaction	16.67

MTSU Interview Results

Section VII: What are the state of business to education interactions in the region? What are the concerns of businesses?

- Although there seem to be good interactions and the schools seem to responsive to the idea of cooperation, all the rest of the statements come with a "but."
  - Willingness to help is there but ability to deliver is below average
  - Business demand for skilled workforce is unmet
  - Business to high school is not good (nearly one-third of businesses mentioned this)
  - Not flexible enough to handle short-term business needs
  - Just a lip-service
  - Educational institutions are not showing their leadership proactively
- Need formal internship programs
- Need a "non-traditional schooling" to meet the short-term demand
  - Community colleges are not flexible enough to change programs to accommodate business needs
  - Area technical schools are performing below average in terms of business responsiveness
  - Schools listen very well but resolution of the issues take longer than business needs
- We need to reinvent ourselves when it comes to education
  - More technical training must be the case / material science/hands-on experience
  - We need to harness our existing resources such as MTSU, UT and Motlow

Section VII: Promoting business interests?

- Compared to state and federal representation, local officials and business associations receive relatively favorable opinions

BI9. Are governments and associations promoting your interests?	
Local government and association	
Not doing a good job	42.42
Yes	33.33
Could be better	24.24
State	
Not doing a good job	46.43
Yes	39.29
Could be better	14.29
Federal	
Not doing a good job	61.90
Yes	19.05
Could be better	19.05

Section VII: Promoting business interests? What are the critical local concerns

- Businesses have wide range of concerns regarding local, state and federal representations
  - Government needs to listen businesses and recognize the fact that there are solid businesses and good citizens in this community
  - Local leadership is not unified; leadership starts at home and goes all way up
  - Leadership is not listening local businesses
    - They don't recognize the real issues we are facing here
- Local associations are neglecting existing businesses at the expense of recruiting the new ones.
- We need to think regionally and motivate leadership to do the same
- Local governments are often creating extreme hardship for small businesses when it comes to handling roads
- State Economic Development officials should listen to rural communities
  - State expects too much from the rural counties
  - There should be resource conservation credits that take off large demand from local governments
- In terms of national representation, there is a disconnect between national representations and rural communities

Section VIII: Expectations from Study

BI10. What would you like to see out of this initiative?

1. A Regional level forum	18. R&D labs and testing centers
2. Access to information about our region	19. Synergy and leadership
3. Attracting better paying jobs	20. Water and environmental issues
4. Competitiveness	21. Community should know what business assets they have
5. Concrete recommendations regarding the problems	22. Efforts to bring companies together in the areas of pressing needs
6. Economic diversity	23. Eliminate or reduce taxes to make industry more competitive
7. Road maps for the future	24. Improve the highway and other rural infrastructure
8. High-paying job creation	25. Set-up a long term vision for regional economic development
9. Emphasis on education and business connection	26. Which companies are buying from whom?
10. Ways to empower this group to produce something tangible	27. Who are the major entities in the region?
11. Encourage skilled labor development/evaluate this issue critically	28. Explore workers comp and its implications for small businesses
12. Focus on existing business/find ways to make them competitive	29. Addressing a whole issue of utility costs
13. Identify some companies suitable for region	30. Regional level one-stop business centers
14. Highway and tax incentives for rural areas	31. Networking opportunities
15. Industry-cluster gaps/list of industries	32. Modify existing incentive packages for small businesses
16. List of recommendations with details	33. Directions about the factors affecting healthy business environment
17. Marketing the region with data	34. Web of entities working together

Thank You!

Questions?

Business Survey Results

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Section I: Overview

- Business Survey Procedure includes the following steps
  - Initially 123 businesses and 28 local officials were indentified
  - Surveys were mailed all businesses, and follow-up calls were made to all survey recipients
  - Due to low response rates from the first stage, we initiated a second round of mailing and e-mailing surveys to the 80 businesses and officials
  - Final results are:
    - 30 surveys were returned
      - 21 Businesses
      - 9 Officials
      - All counties, except Moore, were represented in the survey.

Section II: Findings: Survey-Based Clusters and Their Suppliers: where are they located?

- Ideally, the region may prefer those suppliers located in other states to relocate to the region.

Table.IV.11.Regional Clusters and Their Suppliers

Clusters	Supplier Industries	Region	MSA	Rest of Tennessee	Other States	Other Countries
Petroleum and Gas				Weak	Medium	
Chemical-Based	Chemicals +carbon, coal +metal+paint+machine	Weak	Weak	Medium	Medium	Strong
Metalworking and Fabricated Metal	Aliminum products+ bolt-steel+paint+brass	Weak	Strong	Medium	Medium	
Nondurable Industry Machinery	Steel manufacturing	Weak	Weak	Weak	Weak	
Machine Tools	Textile+ steel+paint+plastics+paperboard	Weak	Strong		Strong	
Motor Vehicle	Steel manufacturing+paint+plastics+fasteners	Medium	Medium		Medium	
Textile and Apparel	Textile +packaging+carpet	Strong			Strong	
Business Services	Pen and pencil+chemical	Medium	Weak		Medium	
Nonresidential Building Products	Chemicals	Strong	Strong	Weak	Strong	
Writing Instruments	Plastics +pen			Strong	Strong	
Food Processing	Poultry +Agricultural systems		Strong			
Paper, Publishing and Printing		Weak	Weak	Weak	Strong	
Plastics	Plastics and resin+raw plastics	Weak	Weak	Weak	Strong	
Wood Prodcessing	Sawmill	Strong				
Wholesale	Aliminum products	Weak	Weak	Weak	Strong	

MTSU Survey

Section II: Findings: Survey-Based Clusters and Their Customers

- Large presence of customers in other states is a plus because region is exporting.

Table.IV.12. Survey-Based Clusters and Their Customers

Clusters	Customer Industries	Region	MSA	Rest of Tennessee	Other States	Other Countries
Petroleum and Gas	Municipalities+federal companies			Weak	Strong	
Chemical-Based	Mining+pharmaceutical companies+iron making+chemical+demolition+chemical manufacturing+alloy smelting+department of defense+oil field	Weak		Weak	Strong	Strong
Metalworking and Fabricated Metal	Plastics+appliance industries+engineering company+minerals+grill industries+waste treatment		Medium	Medium	Medium	
Nondurable Industry Machinery	Auto+building suppliers+mechanic fabrication	Weak	Weak	Weak	Medium	
Machine Tools	Miscellenous manufacturing					
Motor Vehicle	Auto		Medium		Strong	
Textile and Apparel	Education+auto				Strong	
Business Services	Auto	Medium	Weak		Medium	
Nonresidential Building Products	Existing businesses	Strong			Strong	
Writing Instruments	Walmart+other retailers					
Food Processing	Walmart					
Paper, Publishing and Printing					Strong	
Plastics	Home manufacturers+building supplies				Strong	
Wood Prodcessing	Furniture stores+home centers+other locals	Strong		Weak	Medium	
Wholesale	Aliminum+auto	Medium		Weak	Weak	

Section II: Findings: Survey-Based Clusters and Related Industries

- Regional clusters and related industries
  - Have same technology, labor pool and suppliers
  - Produce the same goods
  - But do not have networking opportunities

Table IV.13. Whether or not the related industries have the following features?

Common Features	Yes	No
Same Technology	73.91	26.09
Same Labor Pool	59.09	40.91
Have Common Suppliers	90.91	9.09
Produce the Same Goods	80.95	19.05
Networking Opportunities	44.00	56.00

MTSU Survey (N=25)

Section II: Findings: The Most Common Problems

Table.IV.14. Most Common Problems Faced in the Region	Frequency	Percent
Quality and Quantity of Labor	8	16.33
Foreign Competition	6	12.24
Raw Material Price	5	10.20
General Economy--Oil and Steel Prices	4	8.16
Skilled Workforce	4	8.16
Compliance Costs Associated with Government Regulations	3	6.12
Low Profitability	3	6.12
Retaining Employees	2	4.08
Funding	1	2.04
Labor Cost	1	2.04
Land Availability/Bio Security	1	2.04
Loss of Manufacturing Jobs	1	2.04
Loss of Market	1	2.04
Price Pressure from all Customers in Automative	1	2.04
Seasonal Volume	1	2.04
Clients	1	2.04
Declining Availability of Materials	1	2.04
Diminishing Technically Skilled Employee Base	1	2.04
Employee Soft Skill	1	2.04
Lack of 4-Lane Highway	1	2.04
Labor Force Lack Basic Math and Reading Skills	1	2.04
Technical Resources	1	2.04
When all Labor Issues Combined	***17***	***34.69***

MTSU Survey

- Labor issues top the list
- All labor related issues constitute nearly 35 percent of the all listed concerns
- Next in the list is foreign competition and general economic conditions

Section II: Findings: What are the Critical Business Support Institutions?

Table.IV.15. What are the critical support institutions for your business?

Institutions	Frequency	Percent
Community Colleges and Techology Centers	9	24.32
Economic Development Boards	5	13.51
Area Universities	4	10.81
Government (State/Federal)	4	10.81
Financial Institutions	3	8.11
Aechitectural and Engineering Firms	2	5.41
Skill Trade Institutions	2	5.41
Utilities	2	5.41
Recycling Centers	1	2.70
Steel Suppliers	1	2.70
R&D Labs other than Federal	1	2.70
Rail Road Lines	1	2.70
Technical Contractors	1	2.70
Tennessee Egg Poultry Association	1	2.70
Are Existing Support Institutions Able to Meet Your Business Needs?		
Yes (%)	68.18	
No (%)	31.82	

MTSU Survey

- Community Colleges and Technology Centers are at the top of the list
- Next comes economic development boards and area universities
- 68 percent of the respondents contends with the services they receive from these support institutions

Section II: Findings: Desired Institutions

- Businesses desired to see "other training institutions" in the region
- This suggests that community colleges and technology centers are unable to address all training needs of the area businesses

Table.IV.16. What Kinds of Institutions You Would Like to See in the Region?

Institutions	Frequency	Percent
Other Training Institutions	8	30.77
Higher education	6	23.08
Economic Development Agency	6	23.08
Other (engineering, trade association, consulting)	3	11.54
R&D Labs Other than Federal	2	7.69
Financial Institutions	1	3.85

MTSU Survey

Section II: Findings: SWOT

- SWOT for businesses:
  - Location is a major strengths
  - Labor Pool with necessary soft and basic skills is a major weaknesses
  - While fuel and transportation costs emerge as major global threats, economy/export opportunities present themselves as a major global opportunity

Table.IV.17. Regional Strengths and Weaknesses and Global Opportunities and Threats for Businesses

Regional Strenghts	Percent
Geographic Location/Logistics	19.44
Motivated and Stable Workforce	8.33
Technology/Automation	8.33
Available and Strong Labor	5.56
High Level of Personification	5.56
Knowledge of Product	5.56
Low Labor Cost	5.56
Support Networks	5.56
Highest Quality Environment	5.56
Quality/Timely Delivery	5.56
Local Economy	2.78
Established Reputation	2.78
Management	2.78
Teamwork Philosophy	2.78
Clean Manufacturing Products	2.78
Customer Support	2.78
Good Working Relations	2.78
Low Taxes	2.78
Small Town Life Style	2.78

Regional Weaknesses	Percent
Labor Pool (Basic Skill/Soft Skill)	20.00
Lack of Skilled Workforce	14.29
Economy/Energy-Material Cost	11.43
Highway Access/Location	5.71
Loss of Demand	5.71
Rising Health Care/ WC	5.71
High Cost of Government Compliance	5.71
Out of Touch Business Officials	2.86
Committed Employees	2.86
Education K-12	2.86
Lack of Projects	2.86
Lack of Testing Labs	2.86
Limited Fright Services	2.86
Loss of Jobs	2.86
Bio Security	2.86
Cost Control	2.86
Lack of Funding	2.86
Lack of Steel Supply	2.86

Global Threats	Percent
Increased Fuel/Transportation Cost	22.22
Cheap Labor in Other Countries/China	14.81
Overseas Competition	14.81
Economy/Weak Dollar	11.11
Loss of Jobs to Overseas	11.11
Branch Operations	3.70
New Regulations	3.70
Offshore Production	3.70
Steel Supply	3.70
Urban Development	3.70
Less Environmental Compliance Cost	3.70
Supplier Base	3.70

Global Opportunities	Percent
Economy/Export Opportunities	11.76
Location/Local Transportation	11.76
New/Increased Customer Bases	11.76
Technology/Lincense	11.76
New Unique Products	11.76
Emerging Markets in China	5.88
Joint Ventures	5.88
Mixed Model Production	5.88
New Auto Assembly Plants	5.88
R&D in the U.S.	5.88
Alternative Energy	5.88
Regional Cooperation	5.88

Section II: Findings: SWOT for Suppliers and Customers

- Major strengths for suppliers and customers are
  - access to highway and consistent demand, respectively
- Major weaknesses are
  - fewer domestic resources and regulations/compliance cost, respectively.
- Low cost labor in overseas emerge as a major threats while innovation and globalization create opportunities.

Section II: Findings: SWOT for Suppliers and Customers

- SWOT : major strengths for suppliers and customers are access to highway and consistent demand, respectively. Major weaknesses are fewer domestic resources and regulations/compliance cost, respectively. Low cost labor in overseas emerge as a major threats while innovation and globalization create opportunities.

Table.IV.18: Regional Strengths and Weaknesses and Global Opportunities and Threats for Supplier and Customer Industries

Regional Strenghts for Supplier and Customer Industries	
For Suppliers	For Customers
Access to Highway/Delivery Time	Consisten Demand
Enlarged Training Programs	More Aluminum Use
Excellent Road Network	Local Suppliers
Labor Cost	Location/Infrastructure
Proximity	Low Labor Cost
Support Netwroks	Product Delivery/Response Time
Technology Use/Automation	Retirees with Money
Quality of Products	Stable Environment
Working Relationships	Technology Use/Automation

Regional Weaknesses for Supplier and Customer Industries	
For Suppliers	For Customers
Fewer Domestic Resources	Regulations/Compliance Cost
Lack of Funding/Projects	Location/Logistics
Overseas Competition/Production	Lack of Steel Supply
Rising Raw Material Costs	Lack of Projects
Uneven Demand	Outdated Equipment
Regulations/Compliance Cost	Prices
Lack of Steel Supply	Transportation Cost for All
Location/Logistics	Subtandard Work Ethic
Material/Labor	Entitlement Mentality among Many

Global Threats for Supplier and Customer Industries	
For Suppliers	For Customers
Low Cost Labor	Alternative Technology
Steel Supply	Steel Supply
Oil Prices	Low Labor Cost
Less Environmental Compliance Cost	Cheap Overseas Products
Supplier Base	Loss of Foreign Production
	Less Environmental Compliance Cost
	Oil Prices

Global Opportunities for Supplier and Customer Industries	
For Suppliers	For Customers
Innovation	Globalization/Rationalization
Outsourcing Work	Improved Logistics
R&D in the U.S.	Increasing Exports
Local Transport	Labor Base
More Automative Choosing	Partnering
	Off-shore Purchase
	Selection of Product
	Develop Nich Markets
	R&D Professional Development

MTSU Survey

Section II: Findings: Is the Region Able to Meet Business Needs? Factor Performance Gap

Table IV.19. Factors Important for Your Business Success in the Region	GAP (Region's Performance-Business Needs)	Gap Level
Workforce quality	-74.5	Critical Gap Between Business Needs and Region's Performance
Cost of transportation	-58.2	
Higher education and other training institutions	-39.3	
Broadband access	-32.2	
Utility costs	-31.6	
Labor costs	-26.7	
Availability of capital	-24.9	
Property taxes	-24.9	
K-12 school system	-24.3	
Proximity to suppliers	-21.2	Moderate Gap Between Business Needs and Region's Performance
Transportation availability	-21.1	
Healthcare	-17.4	
Proximity to customers	-14.5	
Support for economic development	-11.2	
Local government officials	-8.5	
Basic infrastructure (water, sewer, solid waste, fire, police)	-6.4	
Professional and business services	-5.6	
Business financing	-4.5	
Proximity to distribution facilities	-3.6	
Child care	4	Region Outperforms Business Expectations
Construction services	15.5	
Housing affordability	18.1	
Environmental concerns	28.5	
Land availability	31.4	

MTSU Survey (sum of excellent + good - sum of very important + moderately Important)

- The greatest gaps are in the areas of workforce quality, cost of transportation, higher education and training facilities, broadband access and utility costs

Section II: Findings: Factors Important for Businesses

BS9. Factors Important for Your Business Success in the Region	Column A. How important are these factors for your business? (%)					Column B. What is the region's performance level for each factor?				
	Very significant	Moderately significant	Slightly significant	Not significant	Not applicable	Excellent	Good	Fair	Poor	Not applicable
Land availability	33.3	16.7	6.7	30.0	13.3	44.4	37.0	7.4	0.0	11.1
Proximity to suppliers	40.0	36.7	10.0	10.0	3.3	29.6	25.9	37.0	3.7	3.7
Proximity to customers	43.3	26.7	20.0	6.7	3.3	22.2	33.3	33.3	7.4	3.7
Proximity to distribution facilities	17.2	34.5	10.3	24.1	13.8	18.5	29.6	29.6	0.0	22.2
Transportation availability	53.3	23.3	13.3	3.3	6.7	22.2	33.3	33.3	3.7	7.4
Cost of transportation	83.3	13.3	0.0	3.3	0.0	11.5	26.9	50.0	7.7	3.8
Labor costs	73.3	20.0	3.3	3.3	0.0	18.5	48.1	18.5	7.4	7.4
Workforce quality	76.7	20.0	3.3	0.0	0.0	0.0	22.2	51.9	22.2	3.7
Availability of capital	30.0	46.7	20.0	3.3	0.0	7.4	44.4	33.3	7.4	7.4
Utility costs	48.3	44.8	3.4	3.4	0.0	26.9	34.6	30.8	7.7	0.0
Property taxes	26.7	50.0	16.7	6.7	0.0	18.5	33.3	48.1	0.0	0.0
Housing affordability	6.9	37.9	44.8	10.3	0.0	25.9	37.0	29.6	0.0	7.4
Environmental concerns	30.0	26.7	26.7	13.3	3.3	22.2	63.0	14.8	0.0	0.0
Support for economic development	30.0	36.7	23.3	6.7	3.3	29.6	25.9	29.6	11.1	3.7
Local government officials	23.3	33.3	30.0	10.0	3.3	29.6	18.5	40.7	3.7	7.4
Basic infrastructure (water, sewer, solid waste, fire, police)	46.7	30.0	23.3	0.0	0.0	29.6	40.7	25.9	3.7	0.0
Broadband access	33.3	43.3	10.0	6.7	6.7	14.8	29.6	29.6	11.1	11.1
K-12 school system	55.2	17.2	27.6	0.0	0.0	18.5	29.6	29.6	18.5	3.7
Higher education and other training institutions	40.0	40.0	13.3	6.7	0.0	7.4	33.3	40.7	18.5	0.0
Construction services	13.3	26.7	40.0	20.0	0.0	14.8	40.7	37.0	0.0	7.4
Child care	10.0	26.7	46.7	10.0	6.7	11.1	29.6	37.0	11.1	11.1
Healthcare	27.6	55.2	10.3	3.4	3.4	7.7	57.7	23.1	7.7	3.8
Business financing	23.3	36.7	23.3	10.0	6.7	11.1	44.4	22.2	3.7	18.5
Professional and business services	10.0	40.0	46.7	3.3	0.0	3.7	40.7	51.9	3.7	0.0

MTSU Business and Economic Research Center: Factor Condition Survey

Section II: Findings: Business Attitudes Survey

- The critical areas of concerns are
  - access to skilled labor,
  - regional networking opportunities,
  - and lack of regional suppliers

Table IV.21. Business Attitude Survey: Knowledge, Labor, Networking, Suppliers and Customers

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Knowledge Dimension						
Q1KD	Our business is sensitive to innovation in production technologies	34.5	17.2	34.5	10.3	3.4
Q2KD	Our employees are continously trained to update their knowledge about our business	10.7	35.7	32.1	21.4	0.0
Q3KD	Our business adapts fast to changing business environment	10.7	50.0	25.0	10.7	3.6
Labor Dimension						
Q4LD	We have access to skilled labor force in the region	6.7	16.7	30.0	33.3	13.3
Q5LD	Our business is skill intensive	21.4	32.1	28.6	17.9	0.0
Q6LD	There is a competition for skilled labor force among employers	30.0	36.7	23.3	10.0	0.0
Q7LD	Labor is plentiful in the region but not the skilled one	27.6	24.1	24.1	13.8	10.3
Networking						
Q8N	Networking opportunities among similar firms are available in the region	13.8	31.0	13.8	31.0	10.3
Q9N	The region has instituions to facilitate networking among businesses	7.1	25.0	50.0	14.3	3.6
Supplier relationships						
Q10S	Our suppliers are from the region	0.0	21.4	53.6	3.6	21.4
Q11S	We work closely with our suppliers	40.7	40.7	7.4	7.4	3.7
Q12S	Our suppliers are facing competitive pressure	51.9	33.3	7.4	3.7	3.7
Demand relationships						
Q13D	Our customers are other businesses and institutions	50.0	28.6	10.7	7.1	3.6
Q14D	Our customers are within the region	17.9	21.4	21.4	21.4	17.9
Q15D	Our customer base is shifting their purchasing pattern	14.8	37.0	22.2	25.9	0.0

Section II: Findings: Business Attitudes Survey

- There appears to be an entrepreneurship culture, but technology and workforce adaptation of technology look problematic. Furthermore, businesses seem to be indifferent to the idea of both industry-wide and firm-level support to increase competitiveness

Table IV.22. Business Attitude Survey: Enreprenuerships, Technology, Regional Focus and Firm Strategy

Enreprenuerships		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Q16E	We closely follow market demand for our products	53.6	32.1	7.1	7.1	0.0
Q17E	We respond quickly to the change in customer taste	28.6	57.1	7.1	3.6	3.6
Q18E	We design and test new products as a product improvement strategy	38.5	19.2	23.1	15.4	3.8
Technology						
Q19T	Our business uses the cutting-edge technology	14.3	14.3	53.6	10.7	7.1
Q20T	Our business is technology intensive	14.3	25.0	28.6	14.3	17.9
Q21T	Broadband access is available in the region	27.6	27.6	27.6	3.4	13.8
Q22T	Our business is on par with the industry standard in adopting new technology	14.3	53.6	17.9	14.3	0.0
Q23T	The region has skilled workforce to adapt new technologies	10.3	6.9	31.0	34.5	17.2
Regional focus						
Q24RF	We have several firms in the region which share the labor force with similar skills	24.1	13.8	37.9	17.2	6.9
Q25RF	We have several firms in the region which share the same customer base	10.3	13.8	37.9	24.1	13.8
Q26RF	We have several firms in the region which use similar production technologies	17.2	24.1	24.1	20.7	13.8
Q27RF	We have several firms in the region which have the same suppliers	10.3	34.5	24.1	17.2	13.8
Q28RF	The region is in need of industrywide support for competitiveness	16.7	23.3	56.7	3.3	0.0
Q29RF	The region is in need of firm-level support for competitiveness	3.4	31.0	55.2	10.3	0.0
Firm strategy						
Q30FS	Our business values regional competition and cooperation	6.7	43.3	36.7	10.0	3.3
Q31FS	We put aside research and development money to invest in new products	19.2	26.9	30.8	11.5	11.5
Q32FS	We continuoisly reevaluate our management style	25.0	21.4	32.1	14.3	7.1

Section II: Findings: Business Attitudes Survey

- Businesses do not see government support as a preferred attitude, however, they would like to see incentives from government to improve business environment
- Global competition has been seen as creating problem for their businesses
- Regional financial and physical infrastructure need to be addressed

Table IV.23. Business Attitude Survey: Government, Globalization, Business Culture, Educational Institutions, Money and Utility/Infrastructure

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Government						
Q33G	Our business needs government support to remain competitive	14.3	14.3	14.3	25.0	32.1
Q34G	We need state and local incentives to improve our business environment	24.1	24.1	17.2	20.7	13.8
Globalization						
Q35GZ	Our business benefits from increasing international competition	3.4	6.9	20.7	37.9	31.0
Business culture						
Q36BC	The region has a business friendly environment	20.0	26.7	33.3	20.0	0.0
Q37BC	The people in the region have positive attitude toward businesses/ business formation	13.3	46.7	20.0	16.7	3.3
Educational institutions						
Q38BC	The region has a quality K-12 educational infrastructure	13.8	24.1	41.4	17.2	3.4
Q39BC	The region has quality post-secondary (universities, community colleges and other training instititues) educational institutions	13.8	41.4	31.0	10.3	3.4
Q40BC	Our business benefits from close interactions with local post-secondary educational institutions	20.7	24.1	24.1	24.1	6.9
Money						
Q41M	Our business has easy access to funding sources in the region	6.9	44.8	27.6	20.7	0.0
Q42M	Our business has easy access to funding sources outside the region	10.3	34.5	24.1	27.6	3.4
Q43M	Region has a plenty of funding sources for businesses	6.9	13.8	58.6	10.3	10.3
Utility/infrastructure						
Q44U	Our region is endowed with a qulity infrastructure (transportation, utility, etc.)	6.9	37.9	37.9	13.8	3.4

MTSU Survey

Section II: Findings: Industry identification

- Many of the businesses identify themselves as part of either exiting or declining industry clusters

Table IV.24. How would you identify your industry?

Clusters	Existing	Declining	Emerging	Potential
Petroleum and Gas	Yes			
Chemical-Based	Yes	Yes		
Metalworking and Fabricated Metal		Yes	Yes	
Nondurable Industry Machinery	Yes			
Machine Tools		Yes		
Motor Vehicle	Yes			
Textile and Apparel	Yes			Yes
Business Services	Yes			
Nonresidential Building Products		Yes		
Writing Instruments	Yes			
Food Processing	Yes			
Paper, Publishing and Printing	Yes			
Plastics		Yes		
Wood Prodcessing		Yes		
Wholesale	Yes			

MTSU Survey

Section II: Findings: Cluster Connection

- Significant number of industries identify themselves as part of the clusters located in the rest of Tennessee and Outside State

Table IV.25. Do You Characterize Yourself as Part of a Cluster Located in

Clusters	Region	Nashville MSA	Rest of TN	Outside State	N/A
Petroleum and Gas		yes			
Chemical-Based			yes	yes	yes
Metalworking and Fabricated Metal		yes	yes	yes	
Nondurable Industry Machinery			yes		
Machine Tools					yes
Motor Vehicle				yes	
Textile and Apparel				yes	
Business Services	yes				
Nonresidential Building Products					
Writing Instruments					
Food Processing					
Paper, Publishing and Printing					
Plastics					
Wood Prodcessing	yes				
Wholesale					

MTSU Survey

Section II: Findings: Cluster Linkage

- 28 percent as part of a value-chain
- 60 percent as part of a cluster sharing the same labor pool
- 12 percent as part of an innovation cluster

Table IV.26. Which of the following best describes your business's linkages to other similar industries in the region?

Linkages	Percent (%)
1. Member of a value-chain cluster (same extended product chain)	28
2. Member of a cluster that shares the same labor pool	60
3. Member of an innovation cluster	12

MTSU Survey

Section II: Findings: Industry-Firm Technology Gap

- 23 percent indicates the existing of technology gap, while 77 percent indicate no technology gap

Table IV.27. Is there a gap between your firm's use of technology and your industry's standards? (%)

Yes	23.1
No	76.9

MTSU Survey

Section II: Findings: Strategic Interactions

- Responsiveness of higher education to business needs tops the list, while skilled labor pool ranks in second
- R&D labs and technology centers rank in third

Table IV.28. What are the strategic business interactions you would like to see in the region? (ranked in the order of importance)

Highly Responsive Higher Education to the Business Needs
Skilled Labor Pool
R&D Labs and Technology Centers
Technical Training Facility That Supplies Skilled Labor Force
Experience Sharing
FMLA Reform
More Qualified Vendors
More Regional Planning on Economic Recruiting and Education
Productivity Improvement
Rural Development Strategy by TDECD
Approved Courses for Multiple State Licensing Boards
Health Care
K-12 Education Stimulation
More Cooperation among Contagious Counties
Stronger Relations with Local Governments/Political Leaders
Support for Tennessee Diploma Project & P-16 Councils
Workers Compensation Reform
Developing Technical Resources for the Future
National Program to Rebuild Failing Infrastructure

MTSU Survey

Section II: Findings: Factors Impeding Healthy Business Environment

- Lack of quality workforce
- Lack of 4-lane highway access and funding
- K-12 education

Table IV.29. What is the single most important regional factor that impedes a healthy business environment? (ranked in the order of importance)

Lack of Available Quality (Skilled) Workforce
Lack of 4-Lane Highway Access/ Federal and State Highway Funding
K-12 Education
Lack of Access to Suppliers and Customers
Cost
Lack of Solid Waste Treatment Facilities
FMLA/ Workers Compensation
Government Understanding of Business Competition
Labor Unions
Lack of Quality Production
Land
Supply Chain
Training of Skilled Workforce

MTSU Survey

Section II: Findings: Factors Promoting Healthy Business Environment

- Availability of quality workforce
- 4-lane highway access and funding
- Motivated workforce with good work ethic

Table IV.30. What is the single most important regional asset that promotes a healthy business climate? (ranked in the order of importance)

High Availability of Quality Workforce
4-Lane Highway/Federal-State Highway Fund
Motivated Workforce with Work Ethic
Business Opportunities
Centralized Customer Base
Cooperation in Workforce Development
Government Attitude toward Business
Local Government
Location/Labor Rates
More Doctors

MTSU Survey

Section II: Findings: How does Government Affect Your Business?

- On the positive side, it has a role that facilitates business interactions and provides help for human capital investment
- On the negative side, regulations may drastically reduce productivity and profit margins
- Many businesses highlighted the negative aspects

Table IV.31. How do government regulations, procedures, and incentives affect your business?

Positive	Negative
Government Funds Drive Quantity of Work	Air Regulations Affect Profitibality of Small Businesses
Have a Major Effect on Businesses (positive)	Add Costs
Helps Bring Industry to Industry Parties Together	Workers Compensation and FMLA
Positive	Makes the Process of Constructing New Facilities Cumbersome
Training/Education	Limit the Business Growths
	Negative
	Sarbanes Oxly Legislation has Created Nonsensical Busy Work
	Slow Implementation of Start-up Projects
	Taxing
	Controlling What We Do

MTSU Survey

Section II: Findings: Important Supporting Institutions that They would Like to See in the Region

- Many indicated that they would like to see a 4-year college in their communities
- Technical training and technology centers as well as testing labs were also highlighted

Table. IV.32. What are the most important regional institutions you desire to have present that are currently absent? (ranked in the order of importance)

Technical Training and Technology Centers
4-Year College/MTSU Campus
Testing Labs/R&D Labs/Educational
Trade/Vocational Schools
Local 2-Year College Training

MTSU Survey

Section II: Findings: Business Attitudes that They would Like to See in the Region

- A recognition and understanding of business dynamics in rural regions
- Emphasis on rural economic development
- Willingness to embrace change

Table IV.33. What is the most important business attitude you would desire to see? (in no particular order)

Better Communication
Customer Service
Government's Recognition of the Impact of Spiriling Fuel and Steel Cost on Businesses Growth
Involvement and Support of Education
Less Emphasis on Labor Unions
Less Litigation
Local and State Governments Working Togetfor for Business Development
More Assistance to Existing Businesses that have been in Tennessee for a Long Time
More Attention to Rural Economic Development by State and Federal Government
Positive Acceptance of Business Challenges
Regionwide Infrastructure Plans
Understanding Competition
Willingness to Embrace Change

Section III: Findings: Advantages and Disadvantages

- Good labor supply and skill, good quality of life, labor pool, location were cited advantages of doing business in the county
- Regulatory environment, workers comp, lack of 4-lane highway, and government assistance programs for existing businesses were cited as disadvantages

Table IV.34. What are the major advantages or disadvantages when it comes to doing business in this region?

Advantages	Disadvantages
Good Labor Supply and Skill	Regulatory Bureaucracy
Good Quality of Life for Residents/Employees	Lack of 4-Lane Highway
Labor Pool	Must Improve Workers Comp
Local Assistance	Need a Regional Center for Industrial Training/Development
Low Cost of Property	Current Administration Needs to Recognize the Impact of TDOT Projects on Businesses
Location	Urban Sprawl
Increasing Technically Trained Workforce	High Medical Cost
Economic Development	Industrial Parks in Counties are Away from Highway
Transportation	Establish Enterprize Zones with Federal and State Tax Breaks
Favorable Regulatory Environment	FMLA
Fiber Optics Availability in Certain Counties	Multiple Level of Taxing Authorities
	Lack of Retails
	Government Assistance Programs for Existing Businesses
	Labor Pool

Thank You!

Questions?

Gaps in Clusters (Preliminary)

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Section III: Cluster Details and Gap Analysis

Section III: Cluster Details with Linkages

Cluster Number 11

Cluster Name **Computer and Electronic Equipment**

Cluster Status: **STAR**

Technology Content: Technology-Intensive

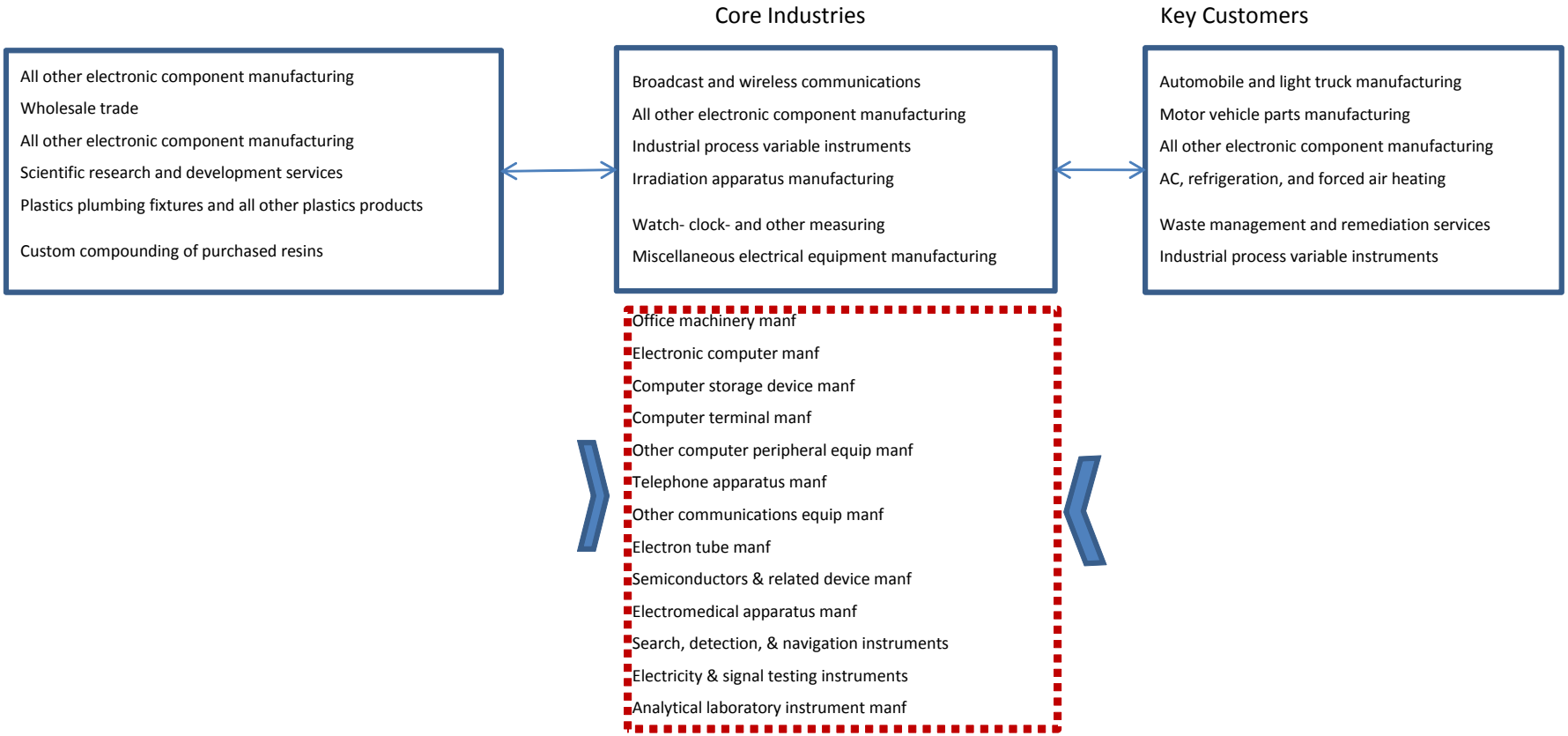
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	15	15	0
Average Wage	**33,489**	**33,863**	**1.12**
Total Employment	1,336	1,096	-17.96

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 12

Cluster Name **Construction Machinery and Distribution Equipment**

	2001 Q1	2007 Q1	% Change
Number of Establishments	7	8	14.28571
Average Wage	**26,040**	**34,963**	**34.27**
Total Employment	1,742	183	-89.49

Cluster Status: **TRANSFORMING**

Technology Content: Semi-Technology-Intensive (50 Percent)

Region's Average Wage (07Q1)<Cluster Wage

$32,192

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**

Key Suppliers	Core Industries	Key Customers
Wholesale trade	Farm machinery and equipment manufacturing	Cattle ranching and farming
Motor vehicle parts manufacturing	Lawn and garden equipment manufacturing	Household goods repair and maintenance
Truck transportation	Construction machinery manufacturing	Poultry and egg production
Plastics plumbing fixtures and all other plastics products	Mining machinery and equipment manufacturing	Cattle ranching and farming
Other state and local government enterprises	Metal cutting machine tool manufacturing	Other state and local government enterprises
Monetary authorities and depository credit intermediation	Turbine and turbine generator set units	Greenhouse and nursery production
Farm machinery and equipment manufacturing	Elevator and moving stairway manufacturing	Animal production, except cattle and poultry and eggs
Motor vehicle parts manufacturing	Industrial truck- trailer- and stacker	Automobile and light truck manufacturing

- Oil & gas field machinery & equip
- Paper industry machinery manf
- Textile machinery manf
- Food product machinery manf
- Rolling mill & other metalworking machinery
- Other engine equip manf
- Conveyor & conveying equip manf
- Overhead cranes, hoists, & monorail systems
- Packaging machinery manf
- Industrial process furnace & oven manf
- Fluid power cylinder & actuator manf
- Electric power & specialty transformer manf
- Railroad rolling stock manf
- Motorcycle, bicycle, & parts manf

Section III: Cluster Details with Linkages

Cluster Number 13

Cluster Name Motor Vehicles

Cluster Status: STAR/MATURE

Technology Content: Semi-Technology-Intensive (46 Percent)

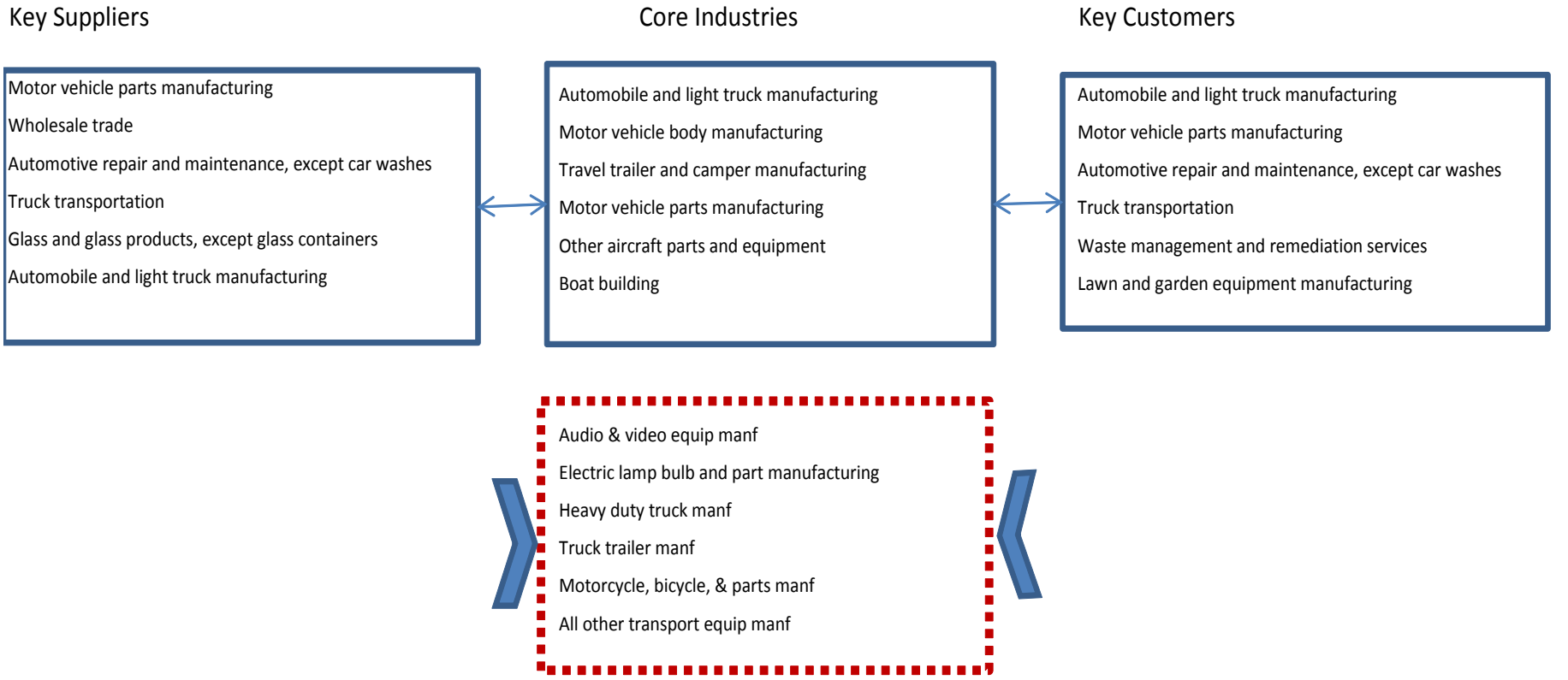
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	37	48	29.72973
Average Wage	**50,008**	**54,157**	**8.30**
Total Employment	13,905	11,544	-16.98

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 21

Cluster Name **Glass Products**

Cluster Status: **STAR**

Technology Content: None

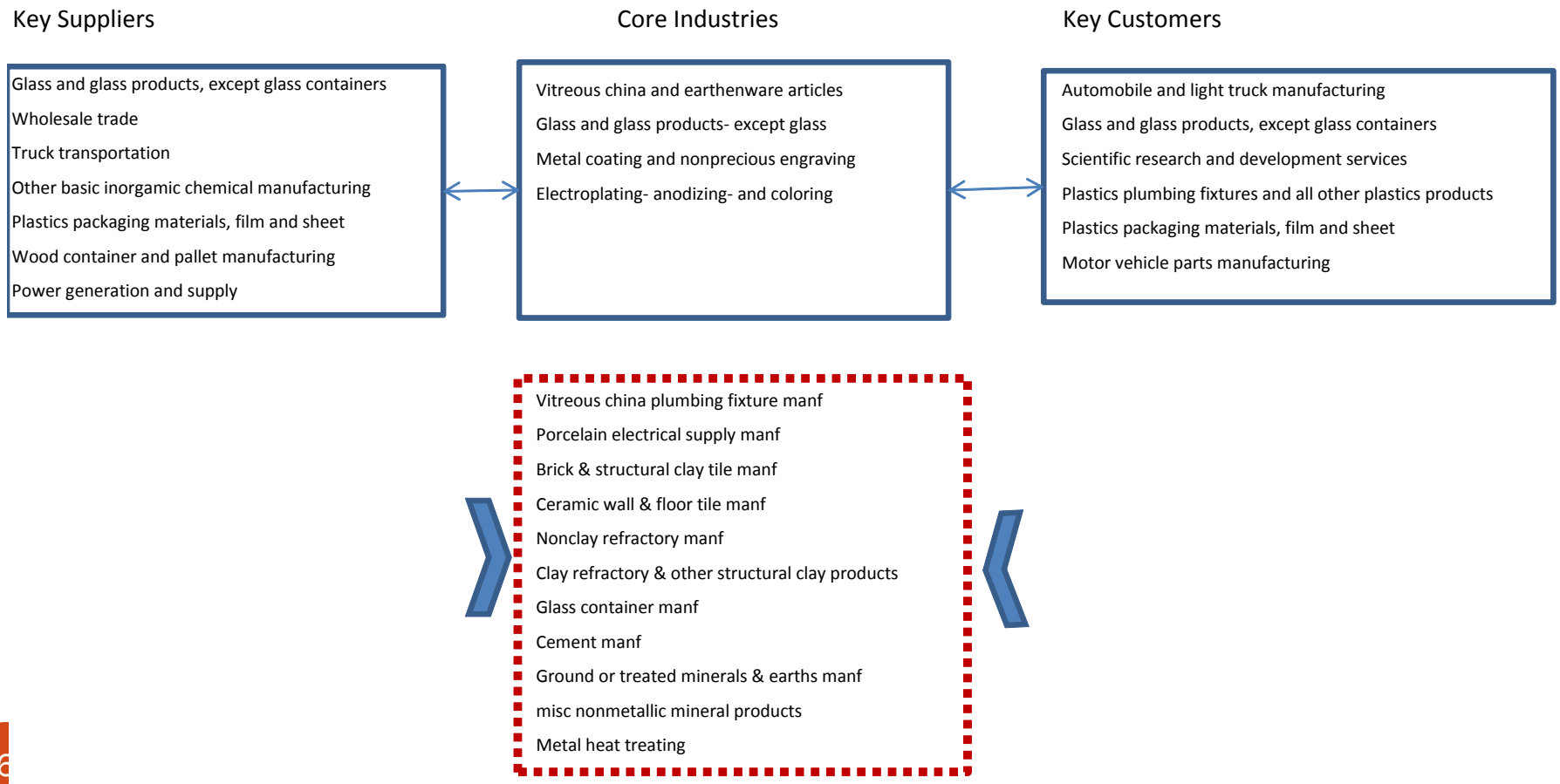
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	10	11	10
Average Wage	**27,091**	**34,932**	**28.94**
Total Employment	1,036	626	-39.58

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 22

Cluster Name **Machine Tools**

Cluster Status: **MATURE**

Technology Content: Small-Technology-Intensive (7 Percent)

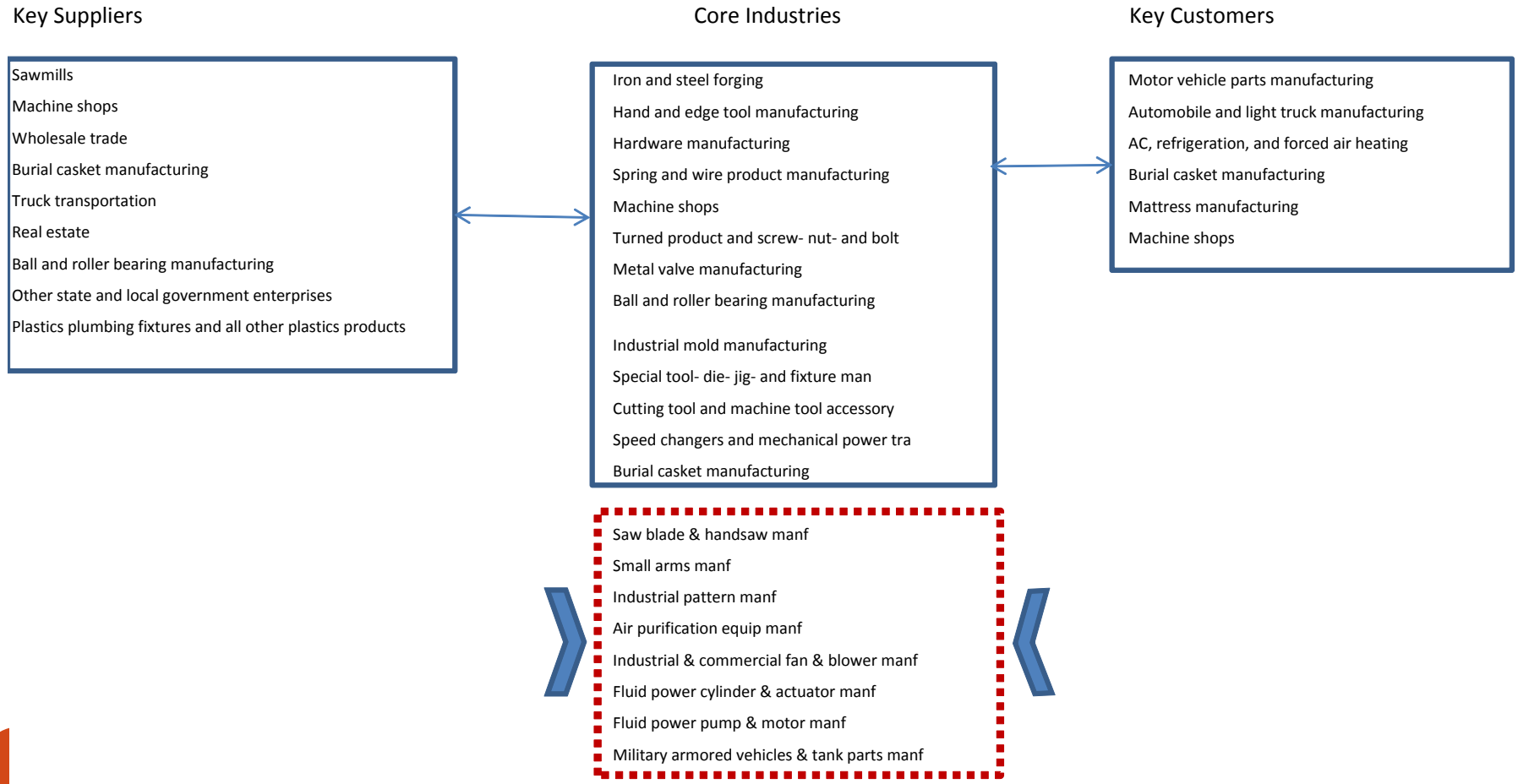
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	91	92	1.10
Average Wage	**33,565**	**43,488**	**29.56**
Total Employment	3,365	2,263	-32.75

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 31

Cluster Name **Concrete, Brick Building Products**

	2001 Q1	2007 Q1	% Change
Number of Establishments	27	31	14.81
Average Wage	**26,567**	**33,924**	**27.69**
Total Employment	626	636	1.60

Solid Line **Cluster membership**

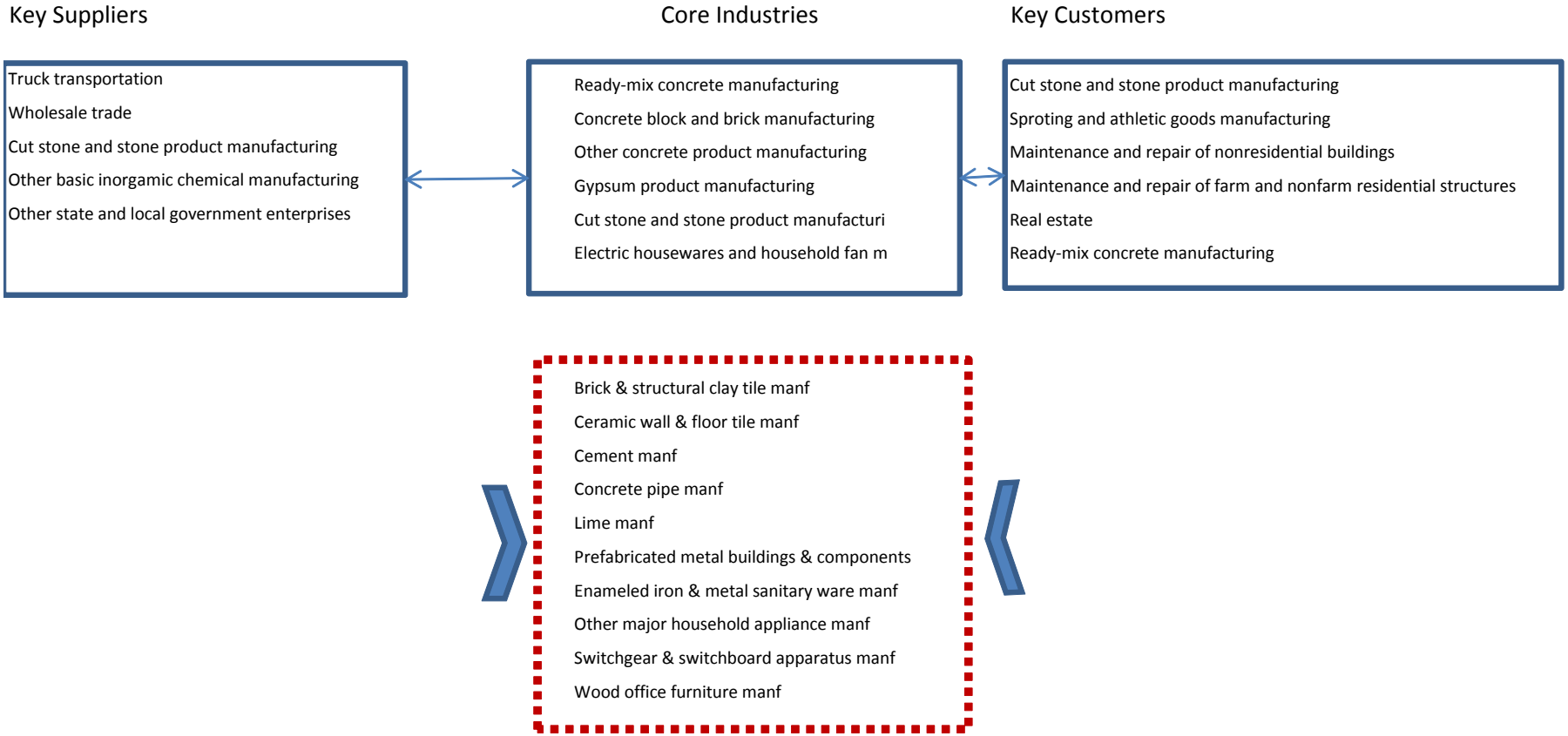
Dashed Line **Gaps in cluster**

Cluster Status: **STAR**

Technology Content: None

Region's Average Wage (07Q1)<Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 32

Cluster Name **Nondurable Industry Machinery**

Cluster Status: **MATURE**

Technology Content: Small-Tehnology Intensive (4 percent)

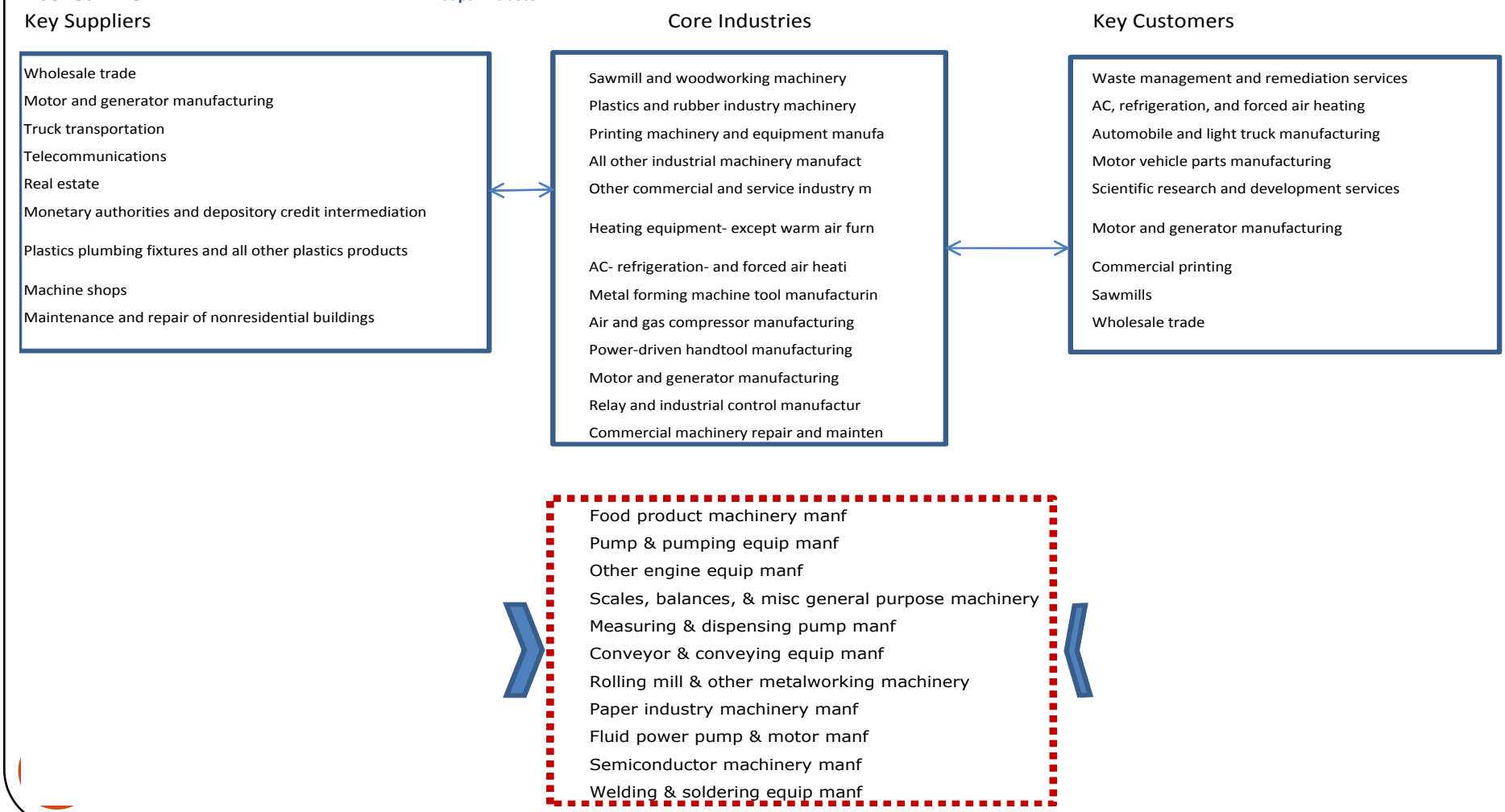
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	73	61	-16.44
Average Wage	**33,809**	**35,018**	**3.58**
Total Employment	10,357	2,376	-77.06

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 41

Cluster Name **Metalworking and Fabricated Metal Products**

	2001 Q1	2007 Q1	% Change
Number of Establishments	41	44	7.32
Average Wage	**31,192**	**32,060**	**2.78**
Total Employment	1,114	1,067	-4.22

Solid Line **Cluster membership**

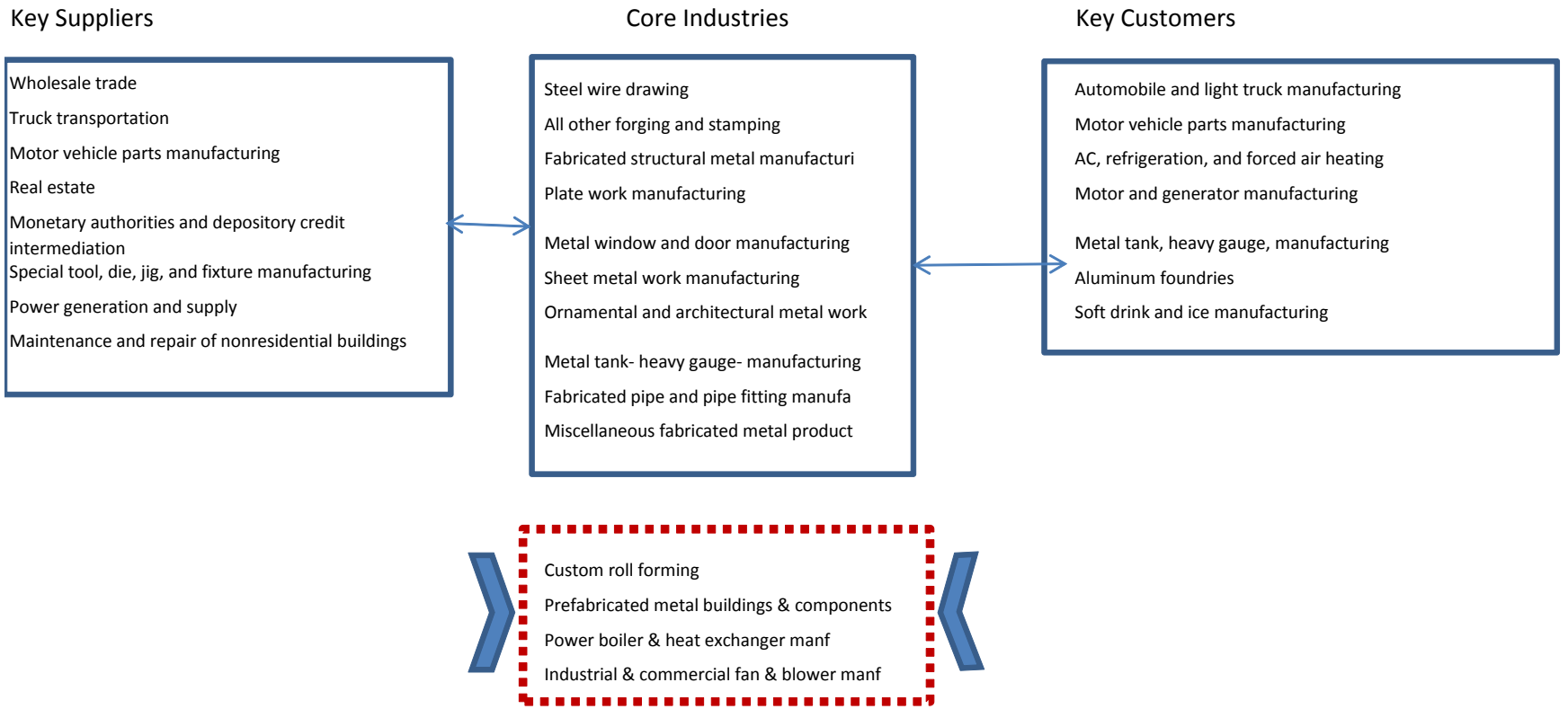
Dashed Line **Gaps in cluster**

Cluster Status: **MATURE**

Technology Content: Somewhat-Tehnology Intensive (22 percent)

Region's Average Wage (07Q1)>Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 51

Cluster Name **Chemical-Based Products**

Cluster Status: **STAR**

Technology Content: Tehnology Intensive

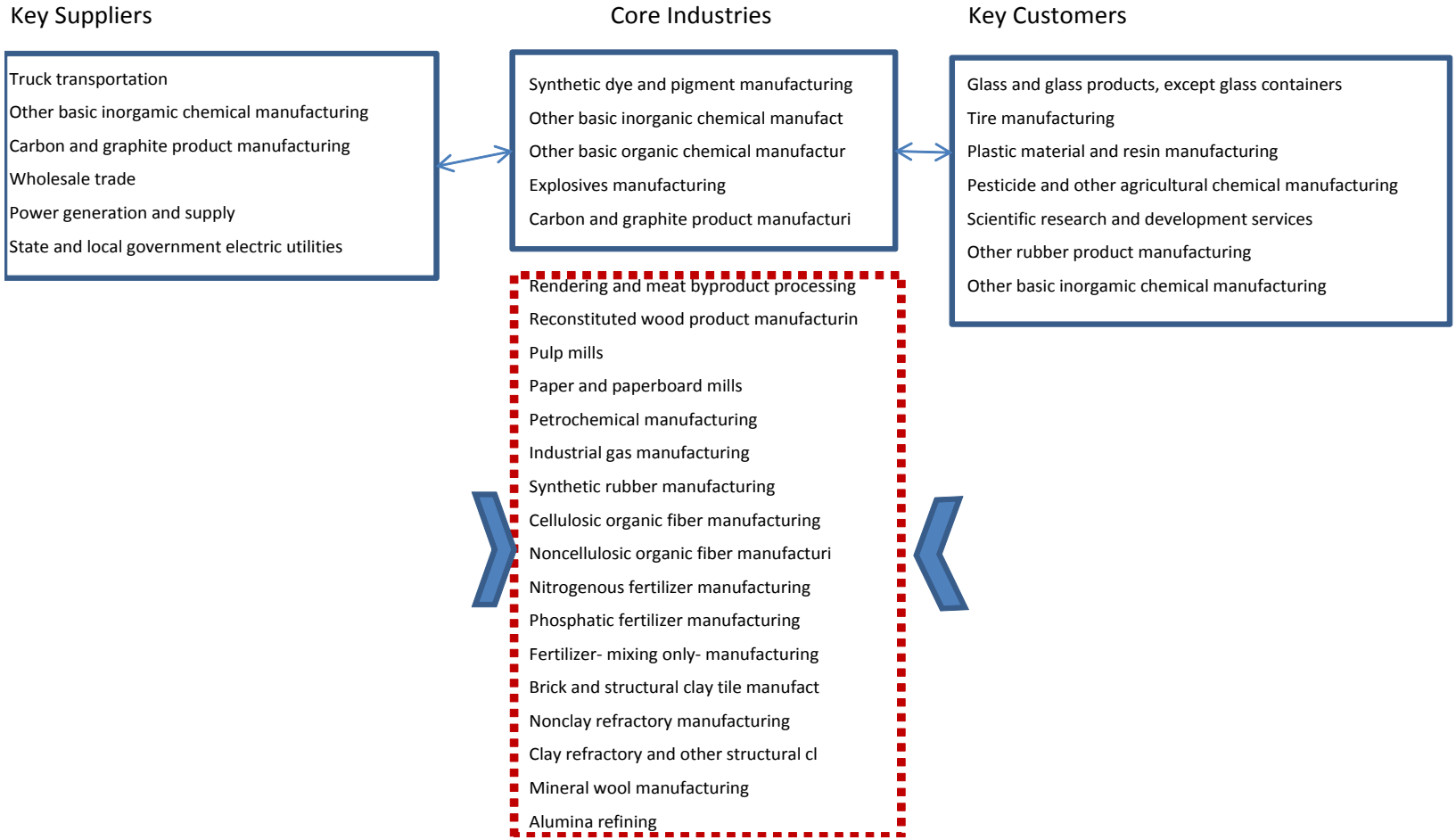
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	5	6	20.00
Average Wage	**112,436**	**84,662**	**-24.70**
Total Employment	260	62	-76.15

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 52

Cluster Name Mining

Cluster Status: EMERGING

Technology Content: None

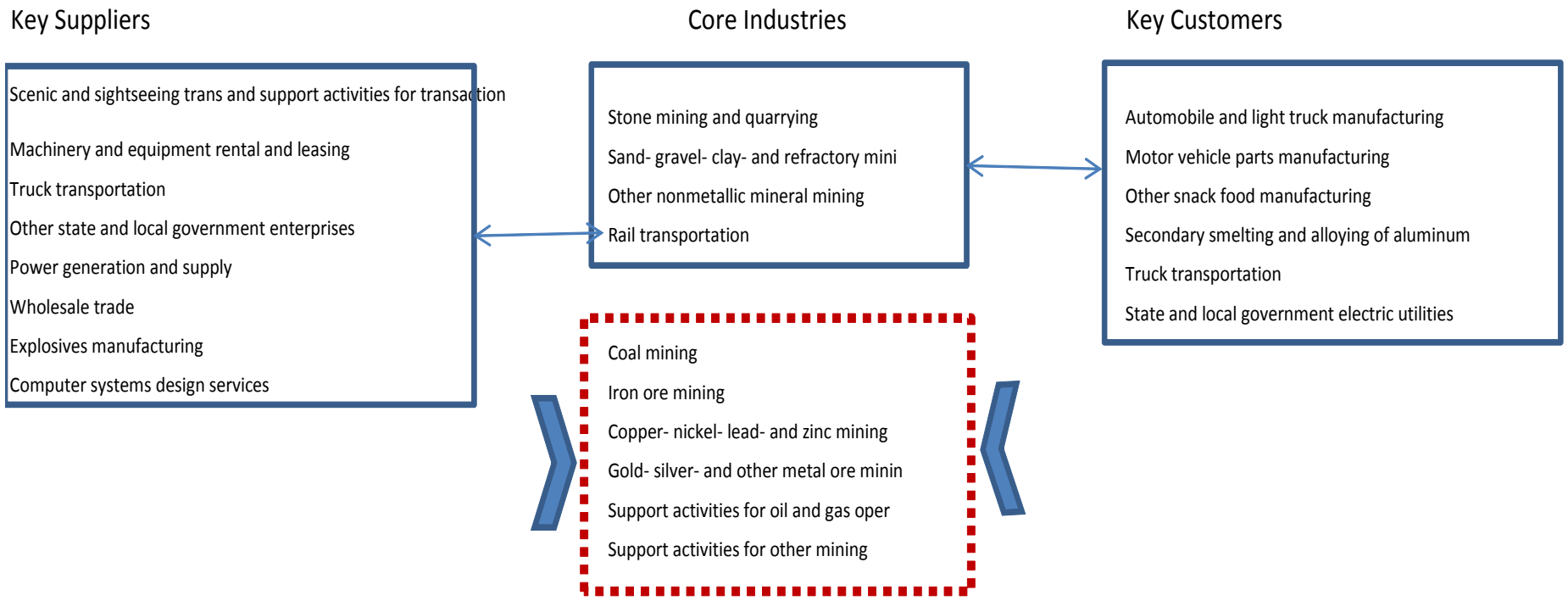
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	17	14	-17.65
Average Wage	**32,047**	**46,694**	**45.70**
Total Employment	232	226	-2.59

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 53

Cluster Name Paper

Cluster Status: MATURE

Technology Content: None

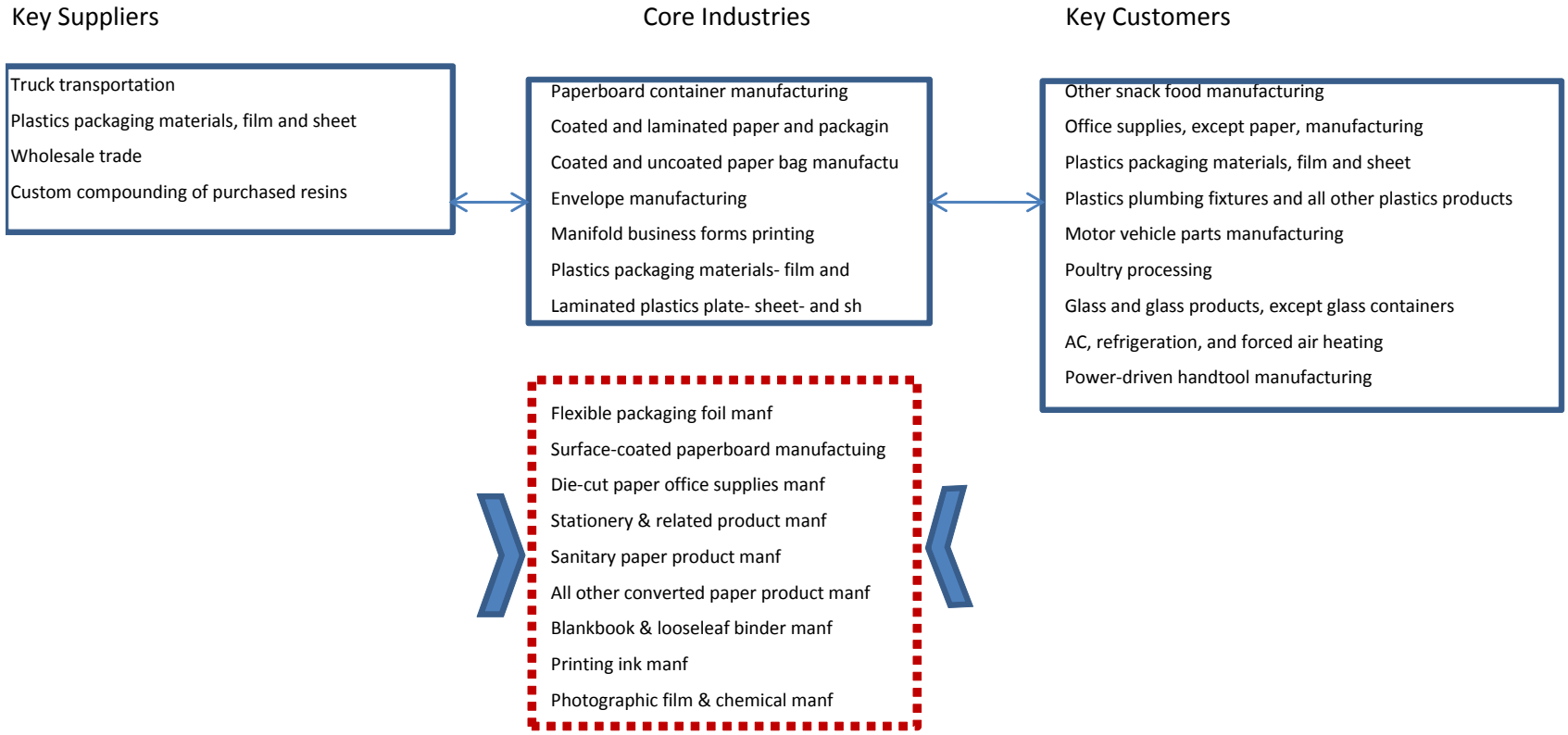
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	48	48	0.00
Average Wage	**34,039**	**39,432**	**15.84**
Total Employment	2,654	2,832	6.71

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 54

Cluster Name **Petroleum and Gas**

Cluster Status: **Emerging**

Technology Content: Somewhat

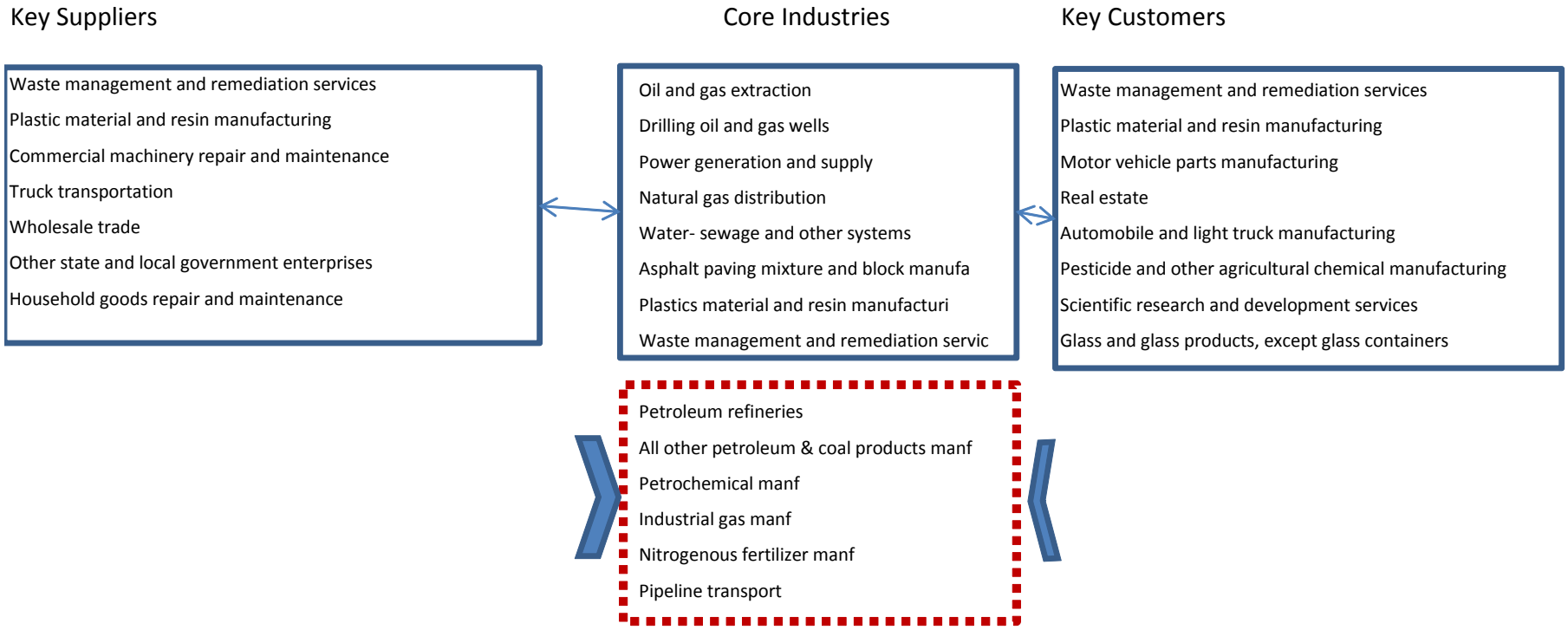
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	101	122	20.79
Average Wage	**35,324**	**39,794**	**12.65**
Total Employment	2,209	2,423	9.69

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 55

Cluster Name **Plastics Products**

Cluster Status: **Mature**

Technology Content: Little (5 percent)

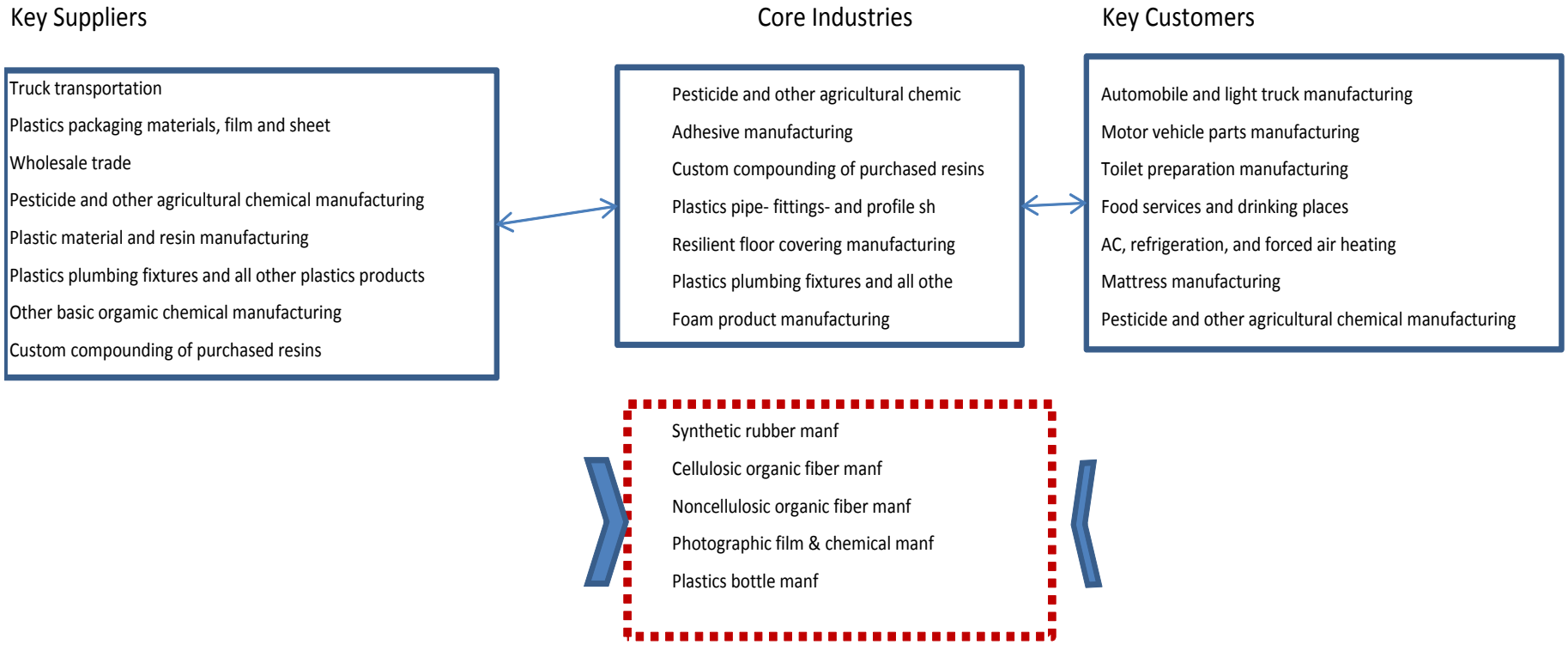
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	39	36	-7.69
Average Wage	**33,513**	**36,342**	**8.44**
Total Employment	2,219	1,764	-20.50

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 56

Cluster Name **Rubber Products**

	2001 Q1	2007 Q1	% Change
Number of Establishments	8	11	37.50
Average Wage	**35,453**	**64,532**	**82.02**
Total Employment	2,762	2,761	-0.04

Solid Line **Cluster membership**

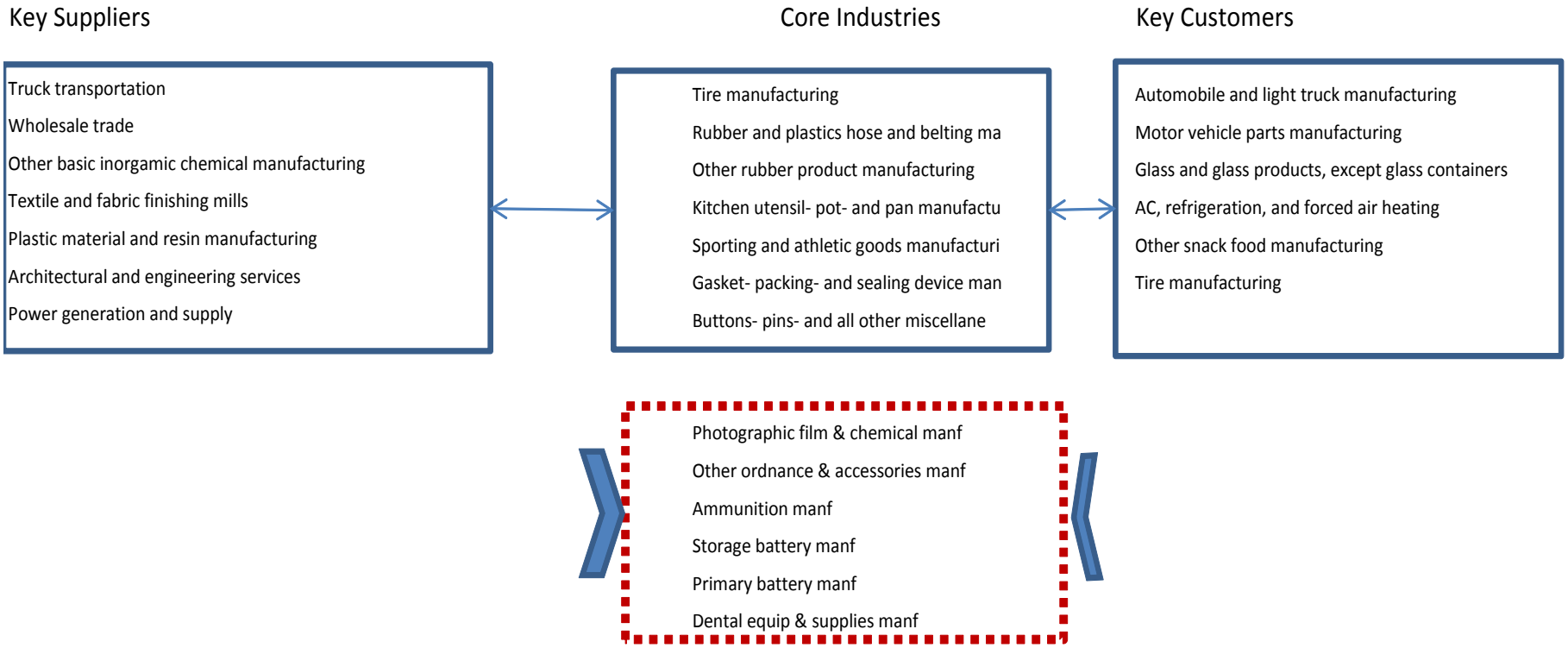
Dashed Line **Gaps in cluster**

Cluster Status: **STAR**

Technology Content: None

Region's Average Wage (07Q1)<Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 61

Cluster Name **Business Services**

Cluster Status: **TRANSFORMING**

Technology Content: Some (10 percent)

Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	806	1039	28.91
Average Wage	**25,205**	**35,723**	**41.73**
Total Employment	11,134	14,566	30.82

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**

Key Suppliers

- Real estate
- Wholesale trade
- Telecommunications
- Couriers and messengers
- Employment services
- Advertising and related services
- Monetary authorities and depository credit intermediation
- Services to buildings and dwellings
- Architectural and engineering services

Core Industries

- Wholesale trade
- Machinery and equipment rental and leas
- Legal services
- Accounting and bookkeeping services
- Architectural and engineering services
- Specialized design services
- Management consulting services
- Environmental and other technical consu
- Advertising and related services
- Office administrative services
- Facilities support services
- Employment services
- Business support services
- Other support services

Key Customers

- Automobile and light truck manufacturing
- Motor vehicle parts manufacturing
- AC, refrigeration, and forced air heating
- Other snack food manufacturing
- Distilleries
- Secondary smelting and alloying of aluminum
- Scientific research and development services
- Office supplies, except paper, manufacturing

Section III: Cluster Details with Linkages

Cluster Number 71

Cluster Name Leather Products

Cluster Status: MATURE

Technology Content: NONE

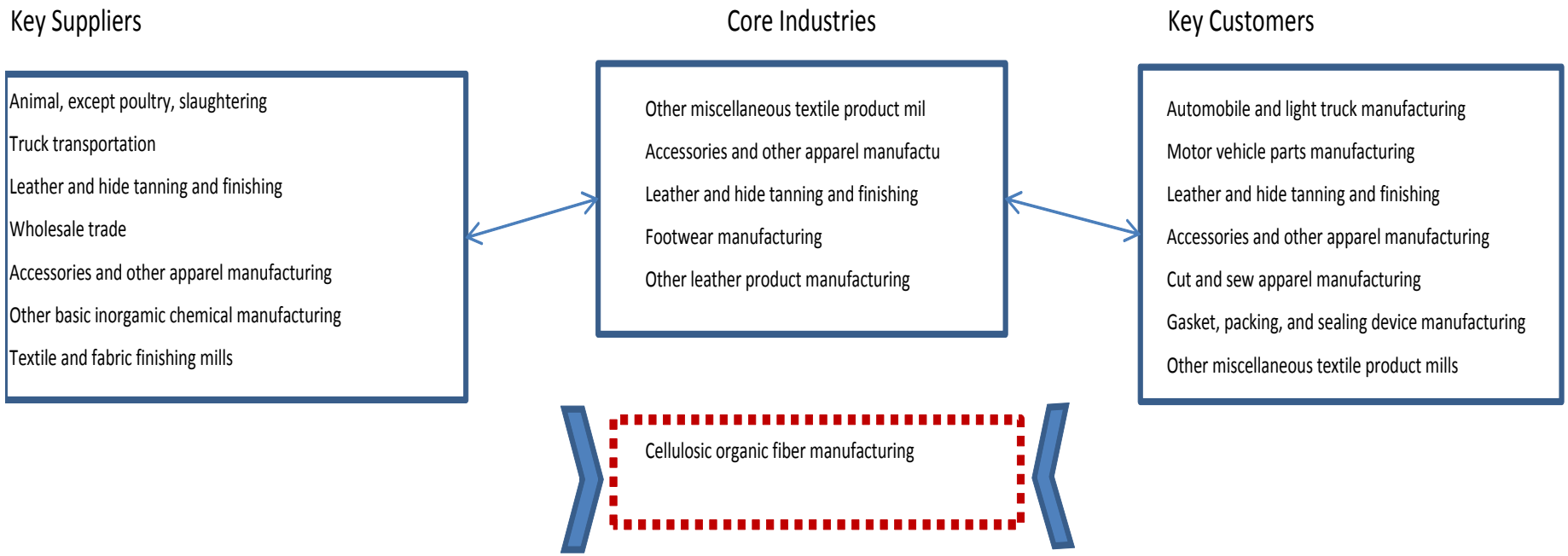
Region's Average Wage (07Q1)>Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	18	12	-33.33
Average Wage	**18,474**	**30,412**	**64.62**
Total Employment	455	197	-56.70

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 72

Cluster Name **Optical Equipment and Instruments**

Cluster Status: **STAR**

Technology Content: Little (6 percent)

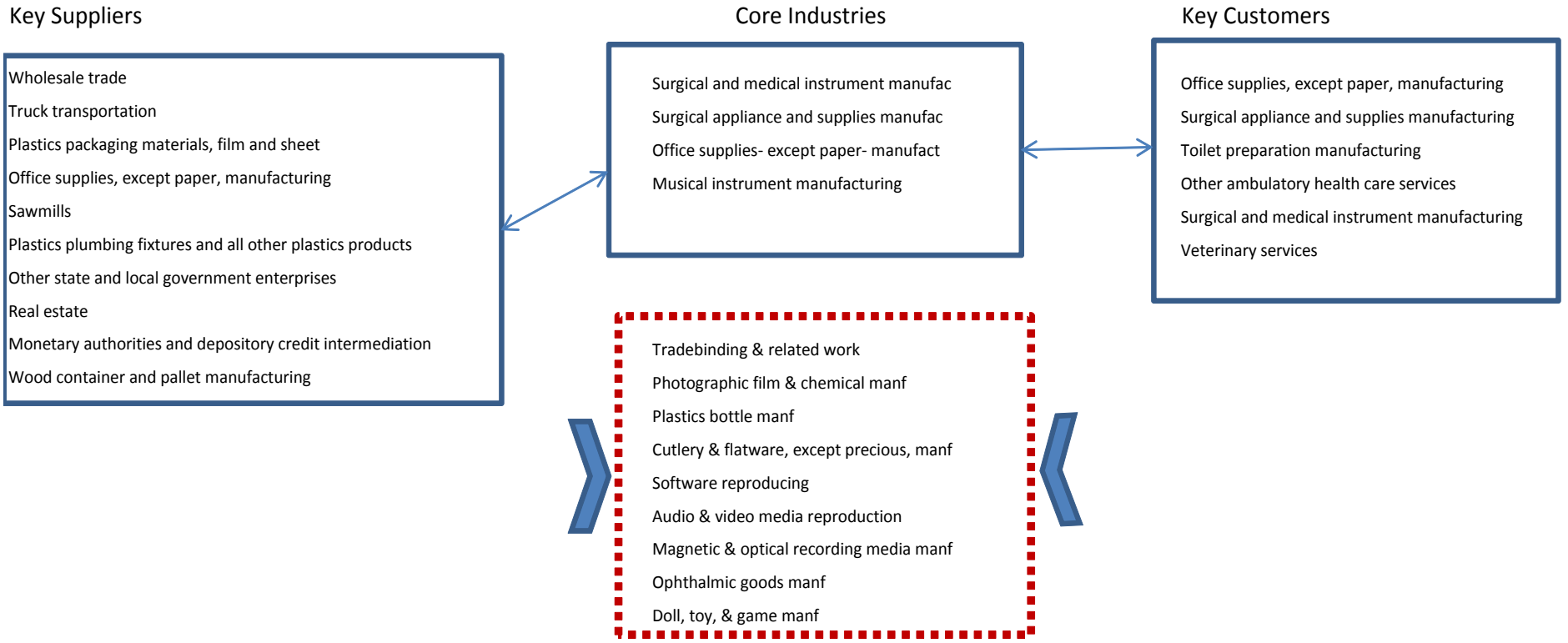
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	54	49	-9.26
Average Wage	**28,250**	**36,590**	**29.52**
Total Employment	4,192	2,916	-30.44

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 73

Cluster Name **Textiles and Apparel**

Cluster Status: **MATURE**

Technology Content: NONE

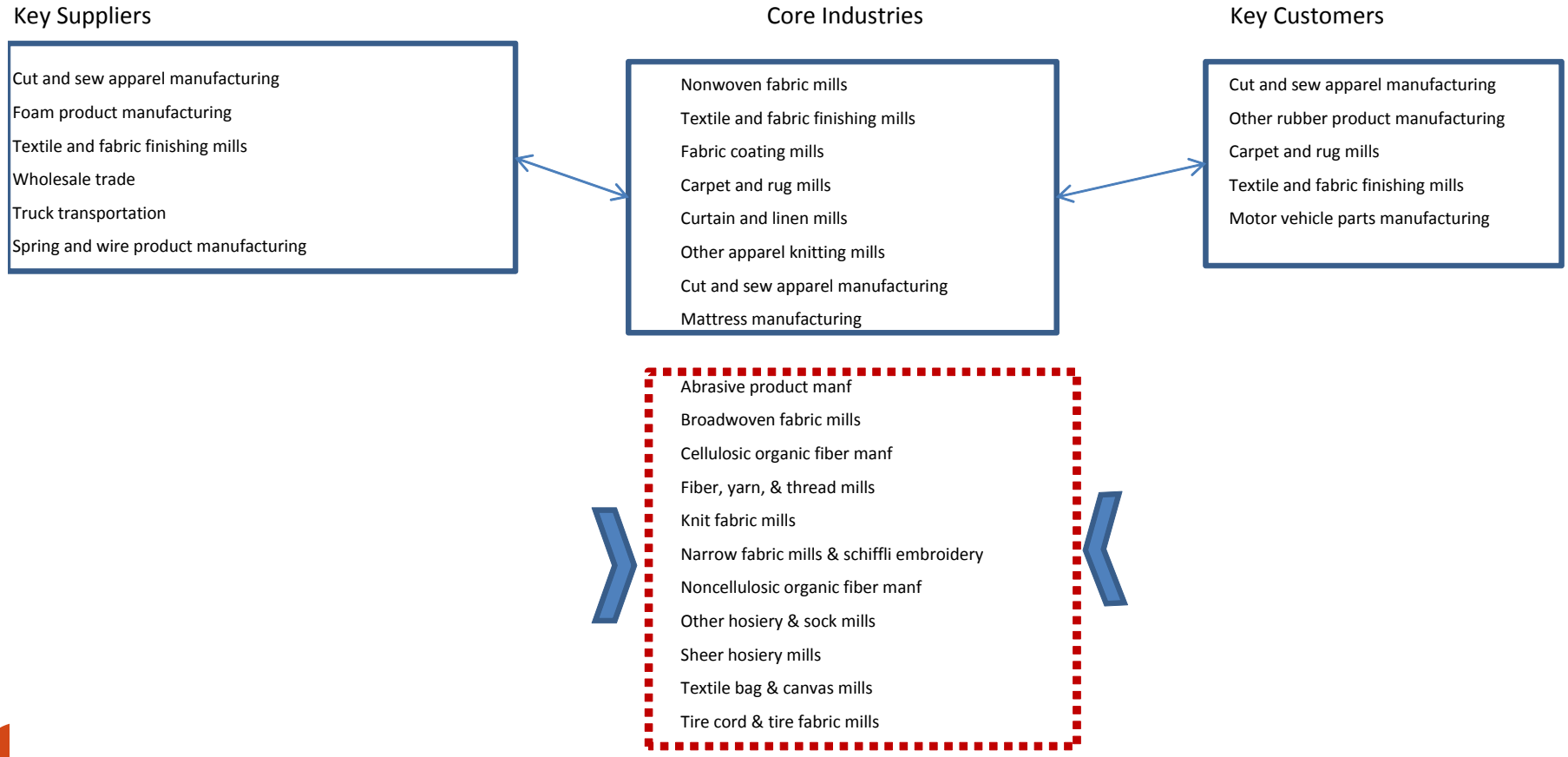
Region's Average Wage (07Q1)>Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	34	29	-14.71
Average Wage	**17,562**	**22,527**	**28.27**
Total Employment	1,976	1,353	-31.53

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 74

Cluster Name Wood Product and Furniture

Cluster Status: TRANSFORMING

Technology Content: NONE

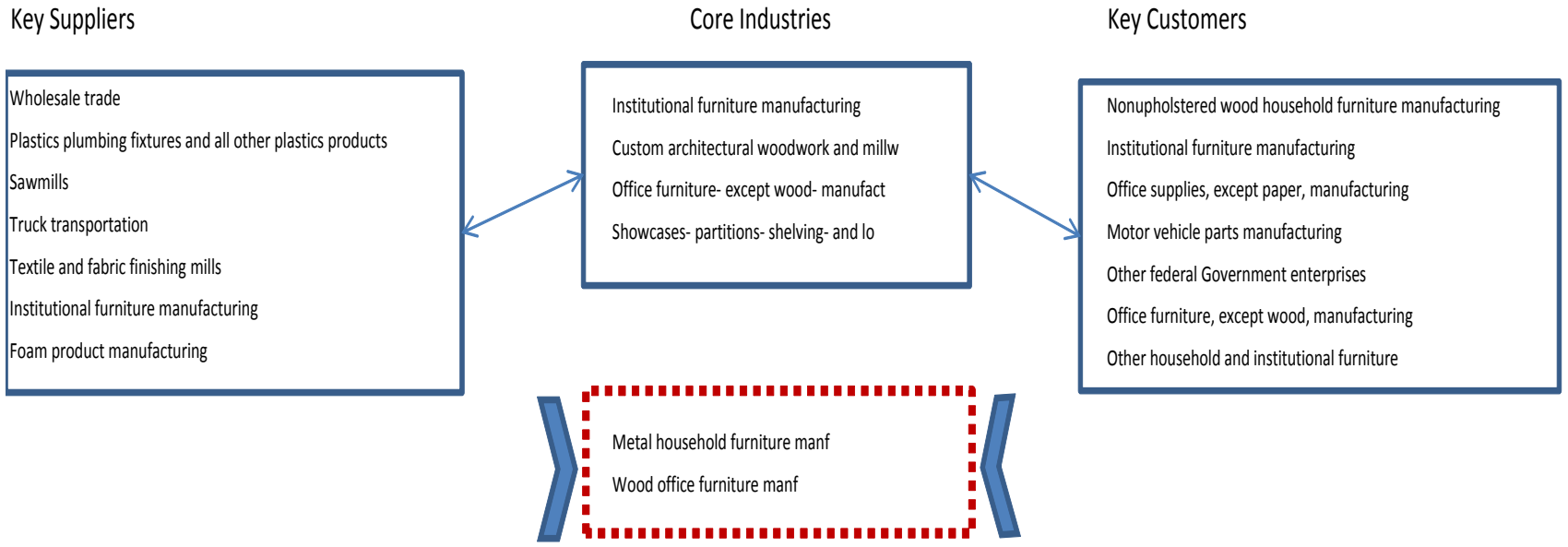
Region's Average Wage (07Q1)>Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	7	8	14.29
Average Wage	**25,521**	**25,450**	**-0.28**
Total Employment	351	102	-70.94

Solid Line Cluster membership

Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 81

Cluster Name **Aluminum and Copper Products**

Cluster Status: **MATURE**

Technology Content: NONE

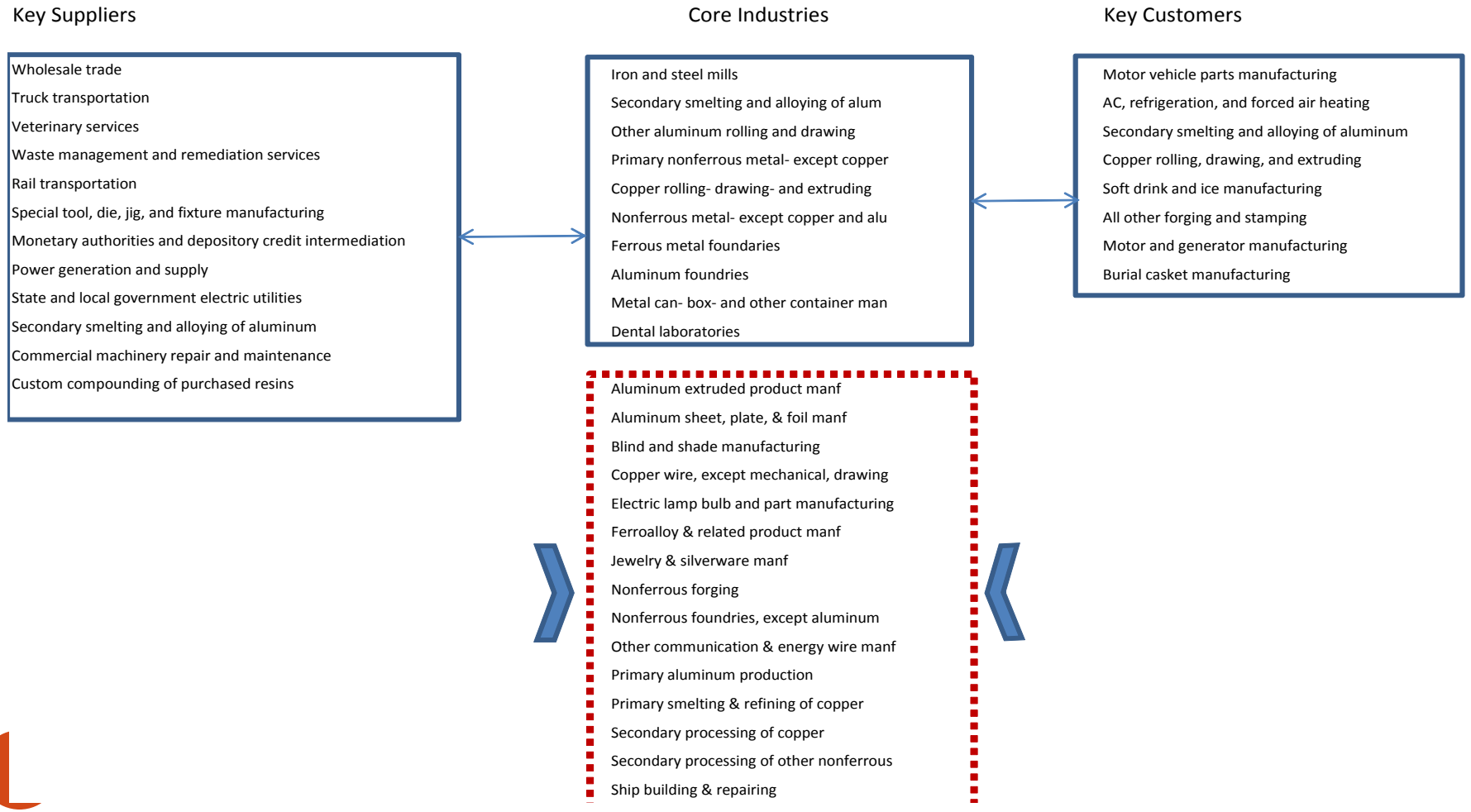
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	19	20	5.26
Average Wage	**33,672**	**51,480**	**52.89**
Total Employment	3,304	2,221	-32.78

Solid Line Cluster membership

Dashed Line Gaps in cluster



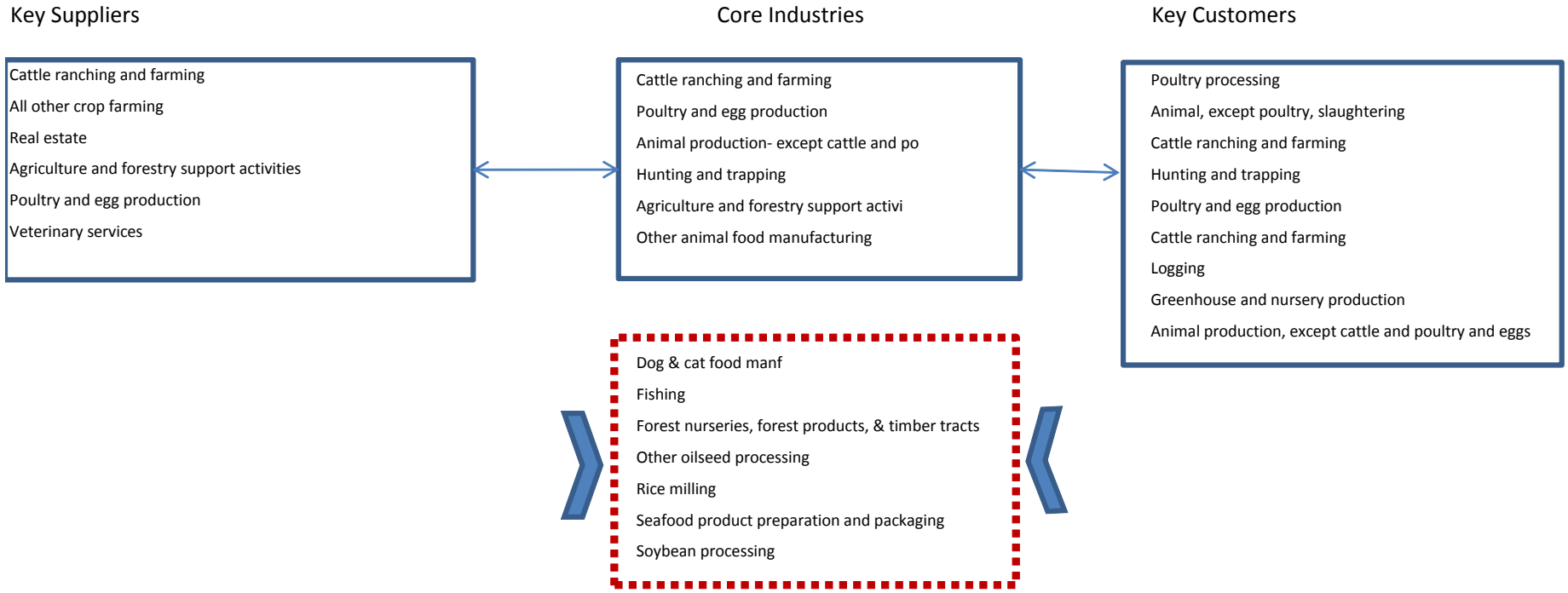
Section III: Cluster Details with Linkages

Cluster Number 91
Cluster Name **Feed Products**

	2001 Q1	2007 Q1	% Change
Number of Establishments	25	23	-8.00
Average Wage	**14,704**	**23,239**	**58.05**
Total Employment	150	90	-40.00

Solid Line **Cluster membership**
Dashed Line **Gaps in cluster**

Cluster Status: **STAR**
Technology Content: NONE
Region's Average Wage (07Q1)>Cluster Wage
$32,192



Section III: Cluster Details with Linkages

Cluster Number 92

Cluster Name **Packaged Food Products**

Cluster Status: **STAR**

Technology Content: NONE

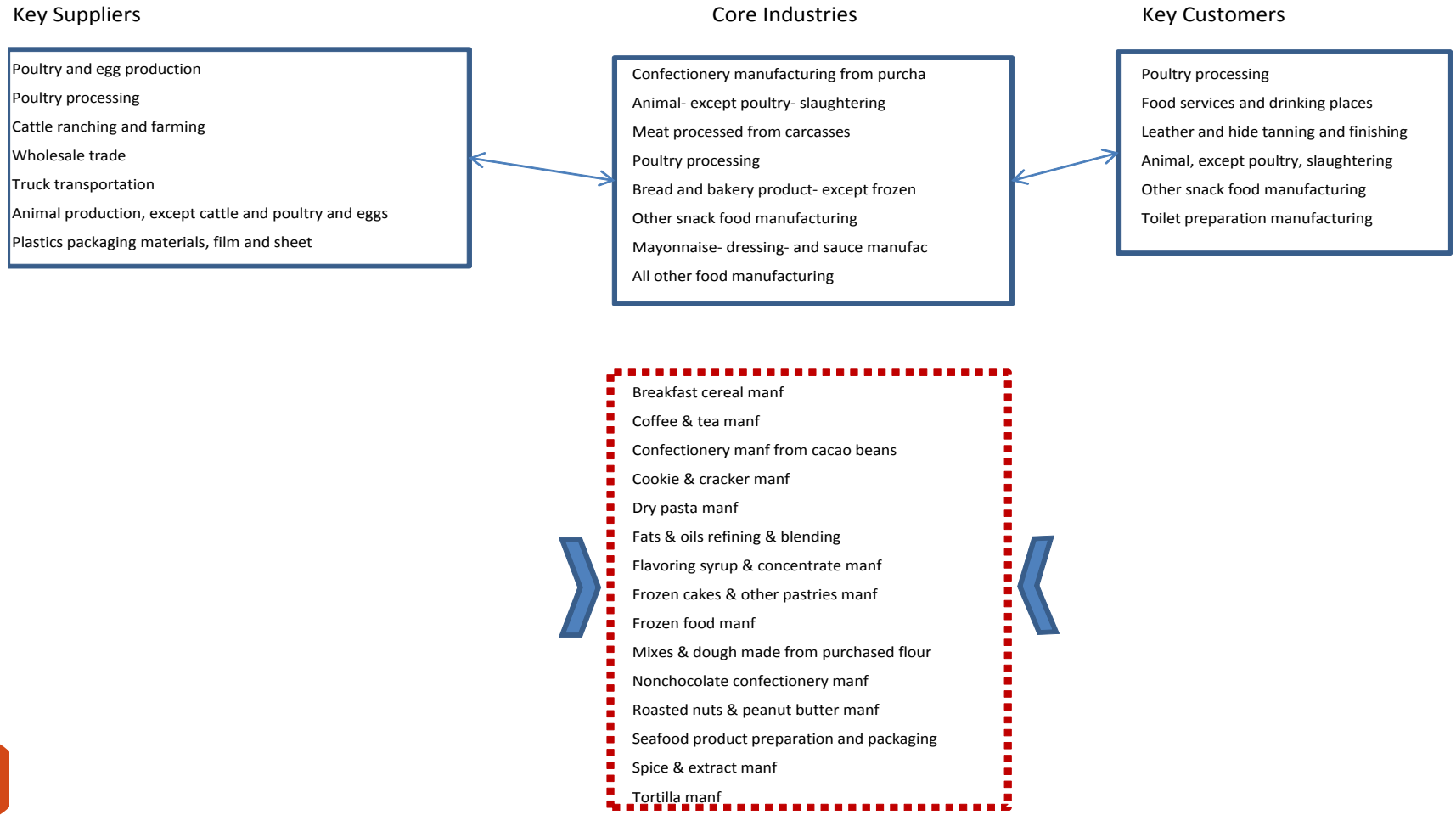
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	19	22	15.79
Average Wage	**27,054**	**33,717**	**24.63**
Total Employment	3,605	3,188	-11.57

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 101

Cluster Name **Hotels and Transportation Services**

Cluster Status: **EMERGING**

Technology Content: NONE

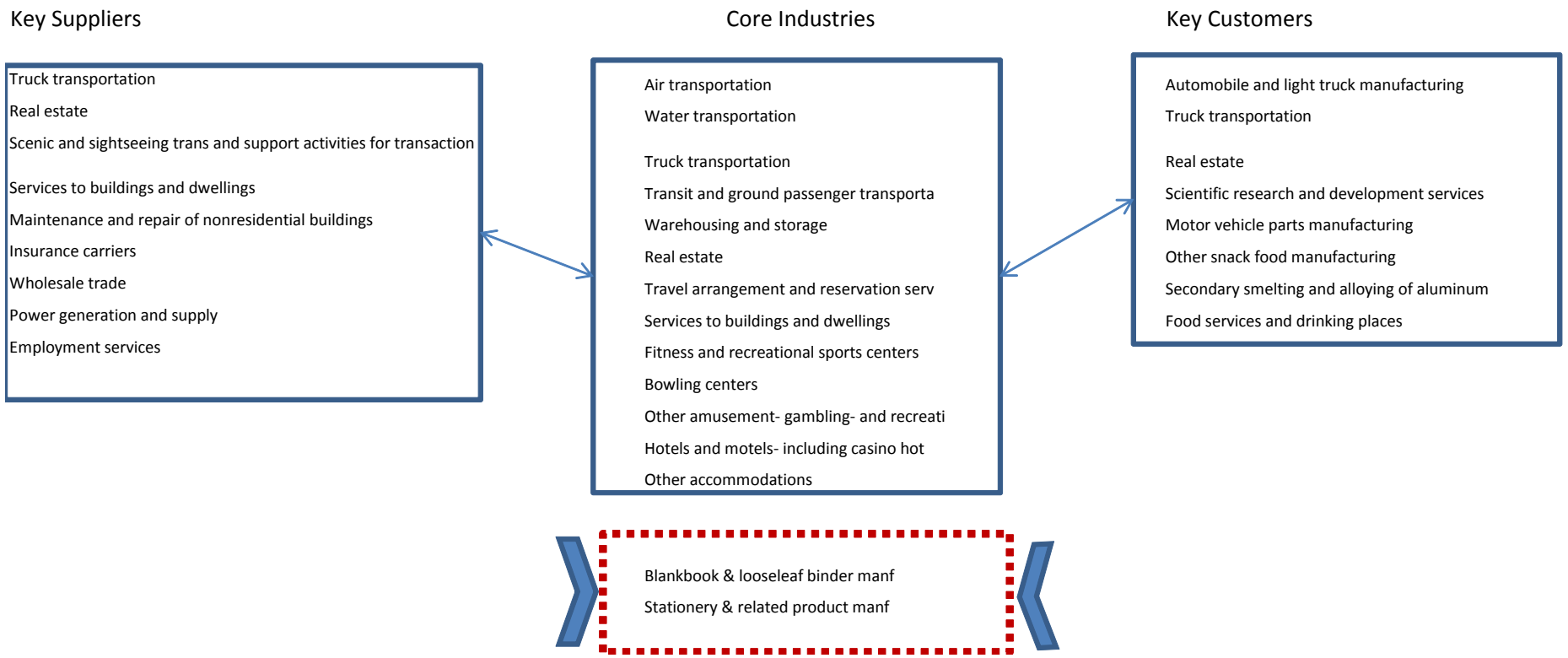
Region's Average Wage (07Q1)>Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	703	757	7.68
Average Wage	**22,347**	**27,994**	**25.27**
Total Employment	5,164	6,506	25.99

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 111

Cluster Name **Management, Higher Education and Hospitals**

	2001 Q1	2007 Q1	% Change
Number of Establishments	164	186	13.41
Average Wage	**39,146**	**36,962**	**-5.58**
Total Employment	6,825	4,131	-39.47

Solid Line **Cluster membership**

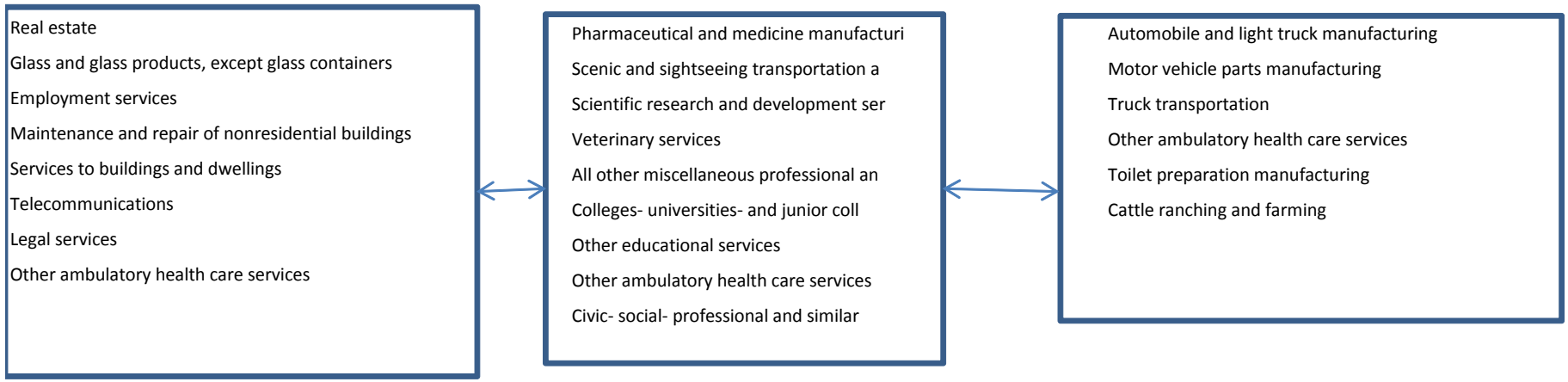
Dashed Line **Gaps in cluster**

Cluster Status: **STAR**

Technology Content: Technology-Intensive

Region's Average Wage (07Q1)<Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 112

Cluster Name Construction

Cluster Status: STAR

Technology Content: Little (14 Percent)

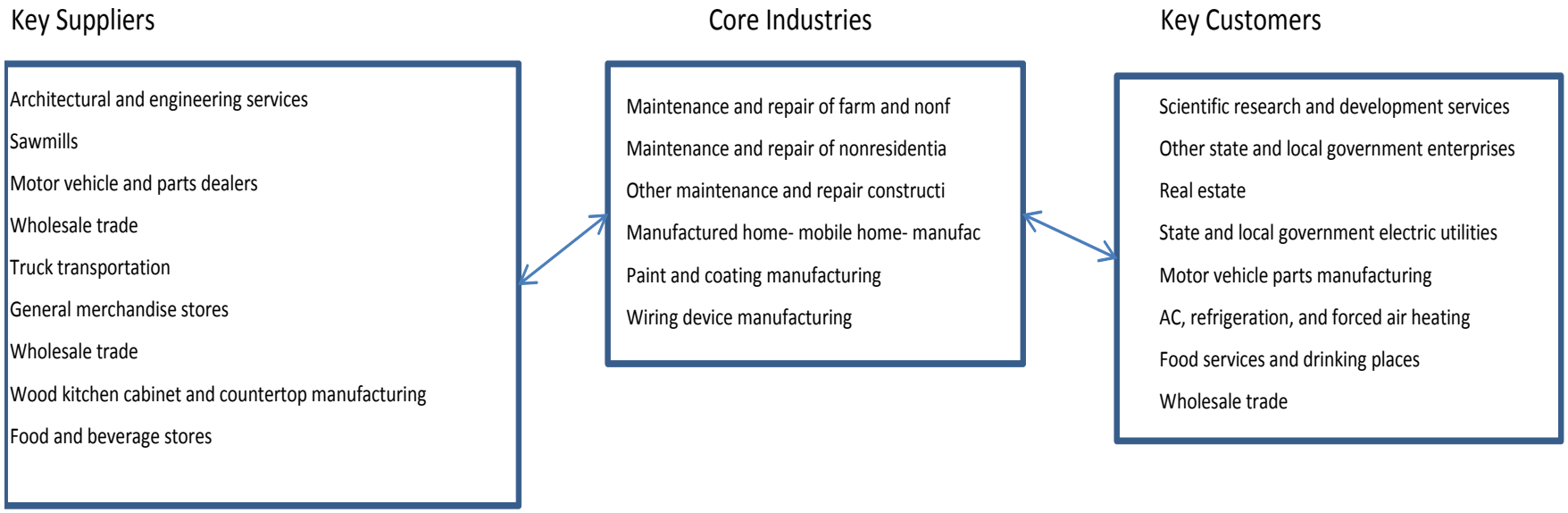
Region's Average Wage (07Q1)>Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	764	882	15.45
Average Wage	**25,443**	**28,196**	**10.82**
Total Employment	5,494	6,313	14.91

Solid Line Cluster membership

Dashed Line Gaps in cluster



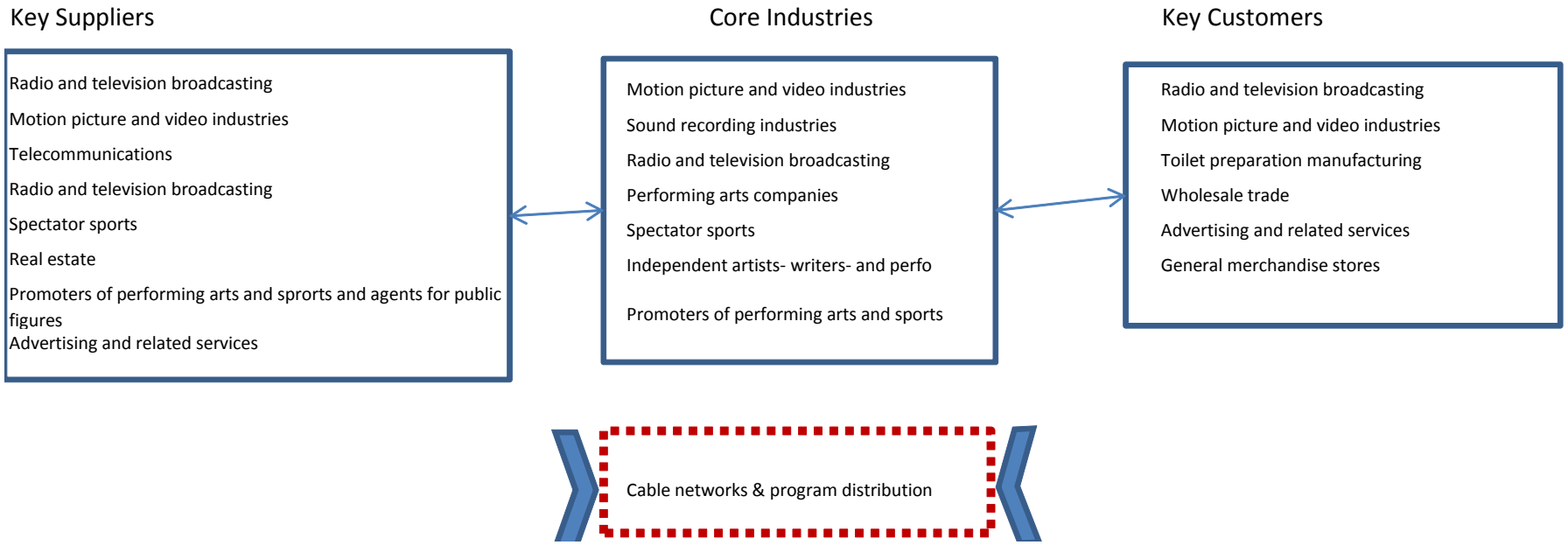
Section III: Cluster Details with Linkages

Cluster Number 121
Cluster Name Arts and Media

Cluster Status: TRANSFORMING
Technology Content: NONE
Region's Average Wage (07Q1)>Cluster Wage
$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	19	21	10.53
Average Wage	**16,582**	**19,088**	**15.11**
Total Employment	159	177	11.32

Solid Line Cluster membership
Dashed Line Gaps in cluster



Section III: Cluster Details with Linkages

Cluster Number 131

Cluster Name **Financial Services and Insurance**

Cluster Status: **EMERGING**

Technology Content: NONE

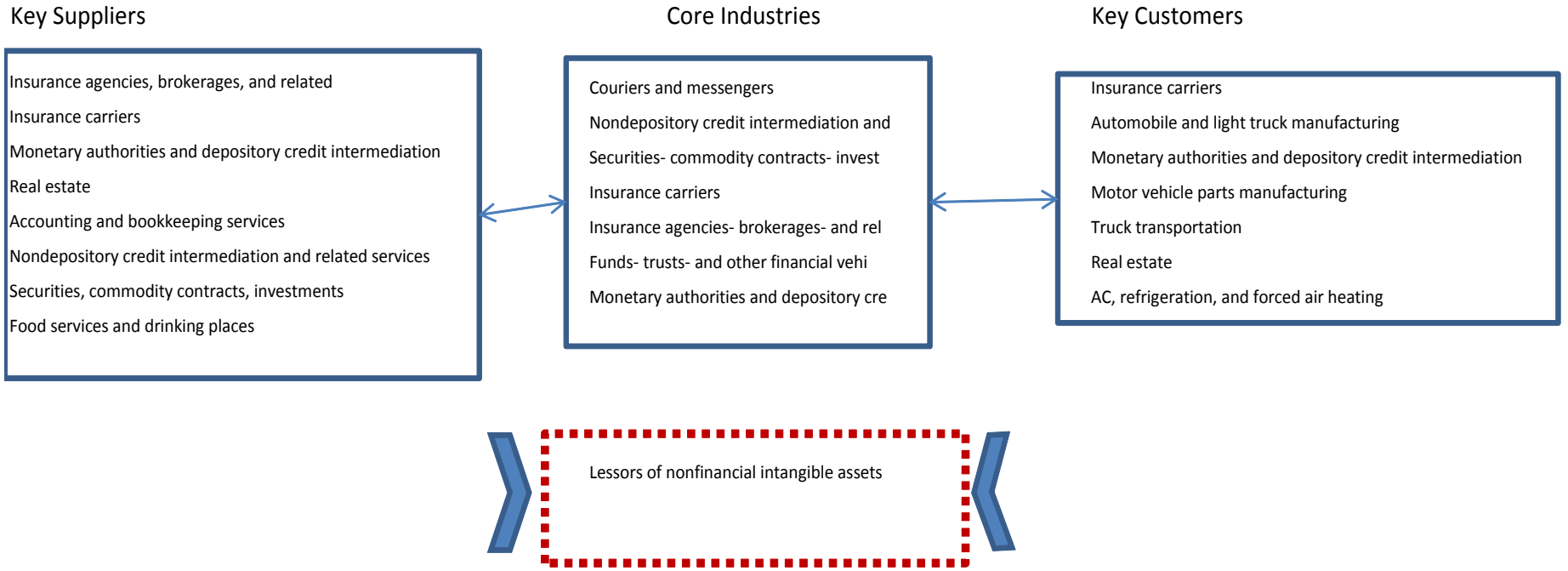
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	248	306	23.39
Average Wage	**33,714**	**45,948**	**36.29**
Total Employment	2,364	3,042	28.68

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 132

Cluster Name **Information Services**

Cluster Status: **EMERGING**

Technology Content: Semi-Technology Intensive (50 percent)

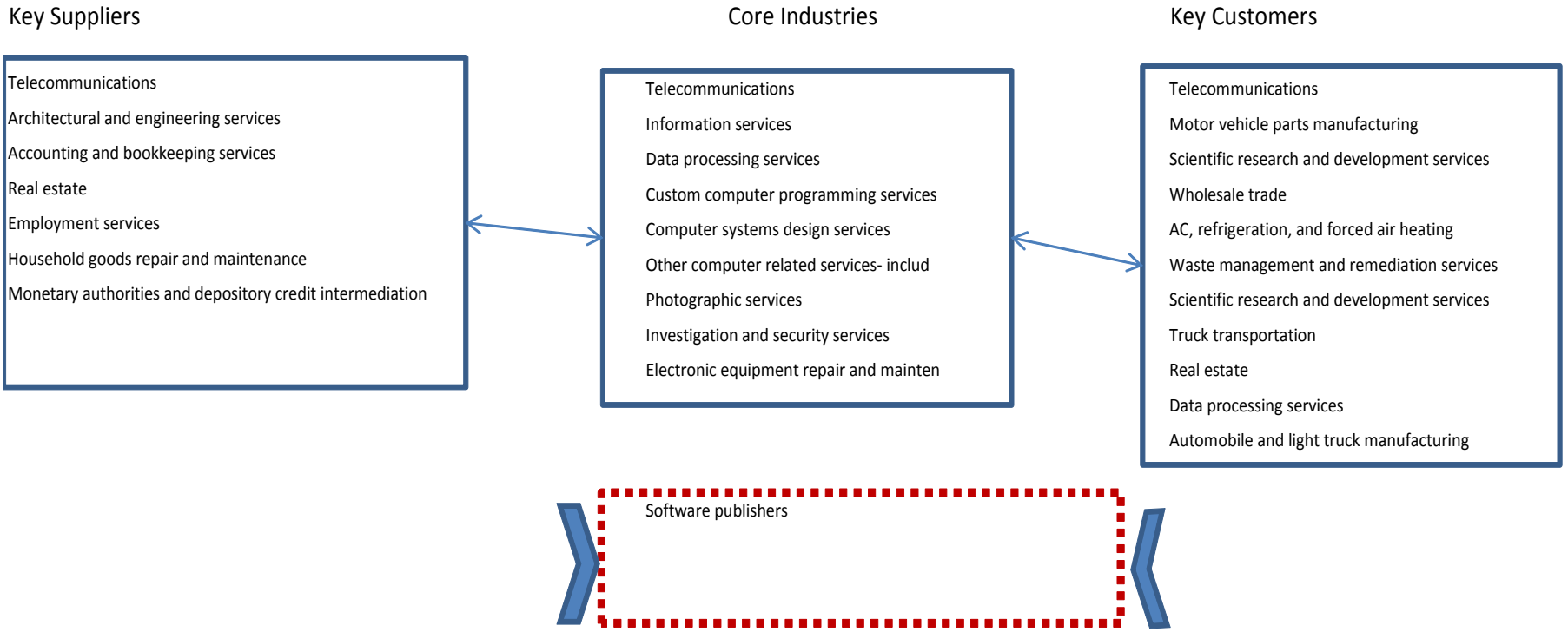
Region's Average Wage (07Q1)<Cluster Wage

$32,192

	2001 Q1	2007 Q1	% Change
Number of Establishments	117	133	13.68
Average Wage	**39,368**	**45,655**	**15.97**
Total Employment	2,406	2,680	11.39

Solid Line **Cluster membership**

Dashed Line **Gaps in cluster**



Section III: Cluster Details with Linkages

Cluster Number 141

Cluster Name **Wood Building Products and processing**

	2001 Q1	2007 Q1	% Change
Number of Establishments	163	157	-3.68
Average Wage	**22,490**	**26,101**	**16.06**
Total Employment	2,373	2,769	16.69

Solid Line **Cluster membership**

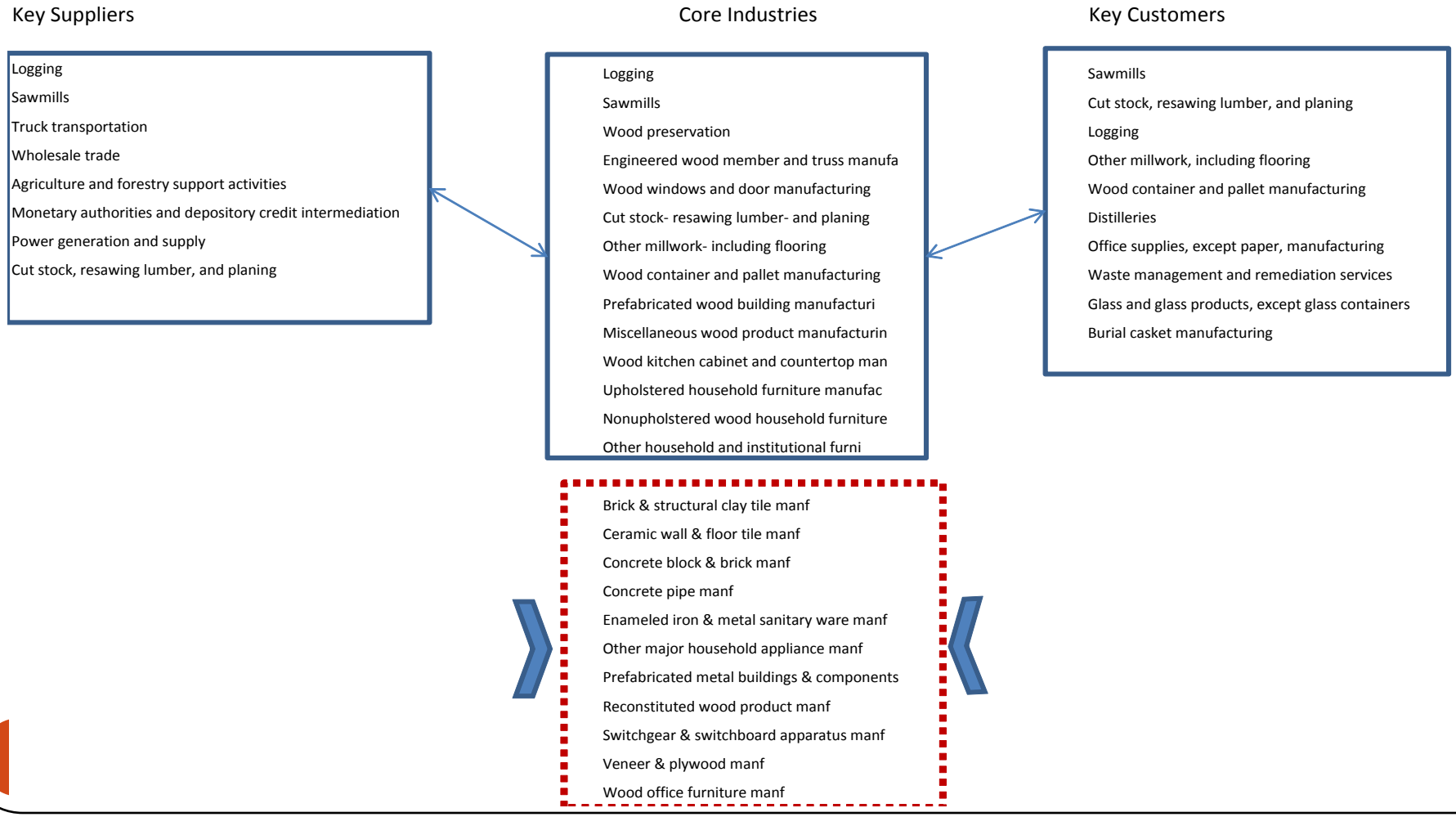
Dashed Line **Gaps in cluster**

Cluster Status: **MATURE**

Technology Content: NONE

Region's Average Wage (07Q1)>Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 151

Cluster Name **Breweries and Distilleries**

	2001 Q1	2007 Q1	% Change
Number of Establishments	11	14	27.27
Average Wage	**28,176**	**42,320**	**50.20**
Total Employment	1,252	853	-31.87

Solid Line **Cluster membership**

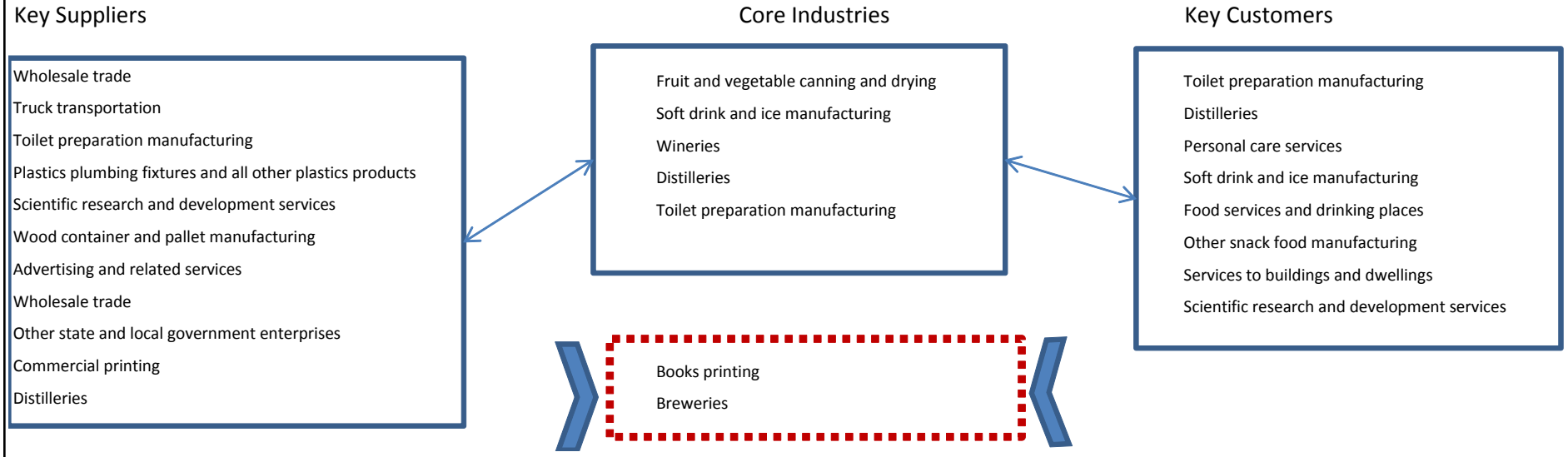
Dashed Line **Gaps in cluster**

Cluster Status: **MATURE**

Technology Content: Negligable (3 percent)

Region's Average Wage (07Q1)<Cluster Wage

$32,192



Section III: Cluster Details with Linkages

Cluster Number 161

Cluster Name **Printing and Publishing**

	2001 Q1	2007 Q1	% Change
Number of Establishments	33	39	18.18
Average Wage	**22,373**	**24,415**	**9.13**
Total Employment	755	893	18.28

Solid Line **Cluster membership**

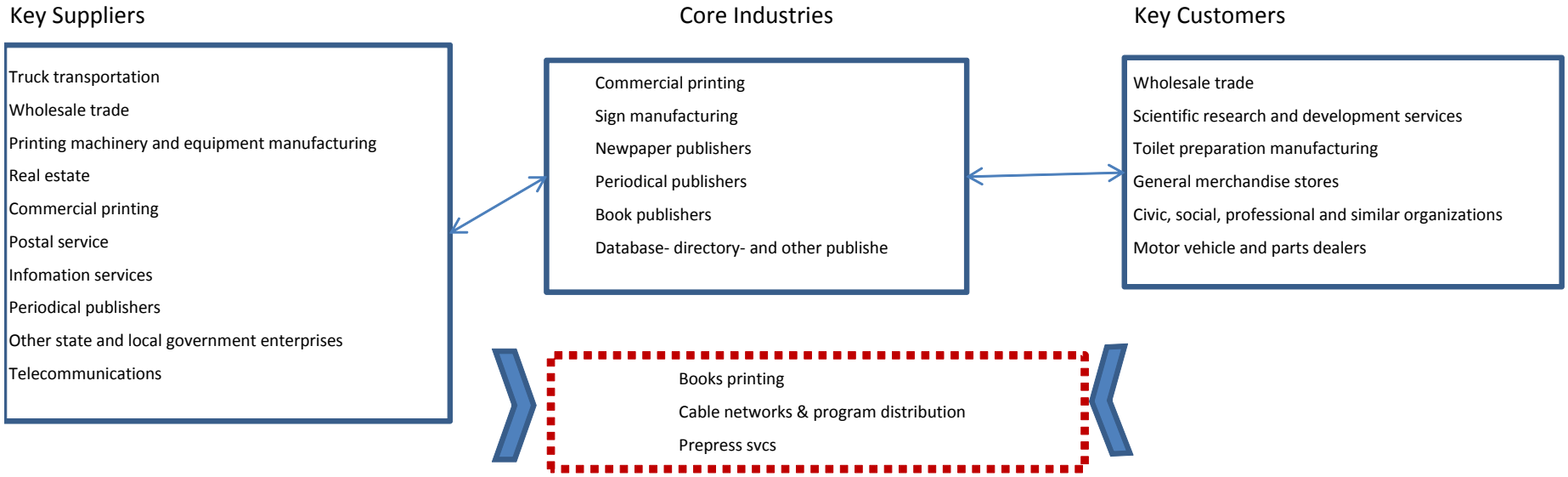
Dashed Line **Gaps in cluster**

Cluster Status: **STAR**

Technology Content: NONE

Region's Average Wage (07Q1)>Cluster Wage

$32,192



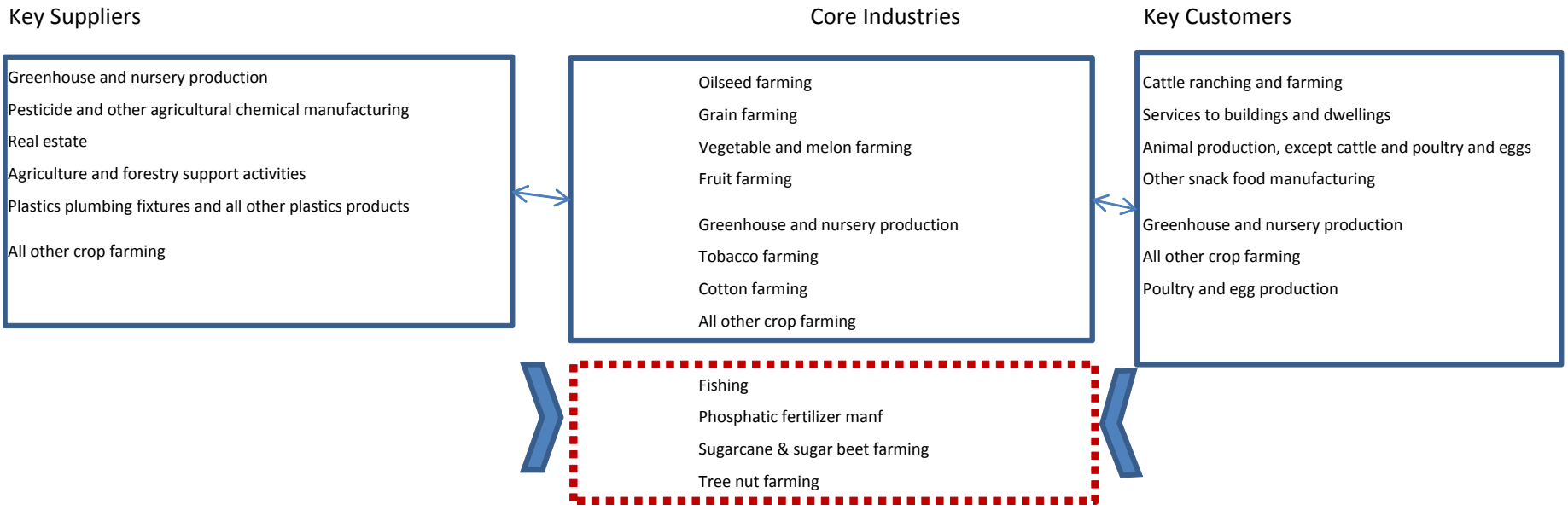
Section III: Cluster Details with Linkages

Cluster Number 171
Cluster Name Farming

	2001 Q1	2007 Q1	% Change
Number of Establishments	56	69	23.21
Average Wage	**17,865**	**22,539**	**26.16**
Total Employment	878	1,010	15.03

Solid Line Cluster membership
Dashed Line Gaps in cluster

Cluster Status: **MATURE**
Technology Content: NONE
Region's Average Wage (07Q1)>Cluster Wage
$32,192



Thank You!

Questions?

Regional Clusters and Commodity Imports

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Section I: Commodity Imports

1. Although performance based cluster rankings and gap analysis give us an idea about the driver industries in the region, we may also want to look at the issue of "import substitution"
    I. The concept of import substitution in the context of the regional economy is related to strengthening existing industries/clusters by bringing their suppliers to the region
    II. This idea is related to the "cluster gap" analysis but goes beyond it by approaching the issue from industry commodity demand
        a. In the tables that follow, "commodity imported" has the same name as the sectors in the regional economy
        b. The first column represents the "commodities imported" and subsequent columns refer to the numeric codes of the regional industry clusters
        c. The last column represents total value of the given commodity imported by the regional clusters

Section I: Commodity Imports/ Targeting Clusters

1. Percent of the commodity imported by each cluster is given in cells
    I. We only included percentages higher than 4.5 for simplicity
2. For example, the regional clusters imported $114 million worth of the commodity of "Audio and video equipment manufacturing" in 2006
    I. Nearly 100 percent (99.39 percent) of this commodity was imported by the cluster number 13, that is "Motor Vehicle" cluster
    II. Targeting "audio and video equipment manufacturing" sector would make perfect sense as it will strengthen a high performing regional cluster by bringing the suppliers to the region
3. The following two (2) tables include top 50 commodities imported by the regional clusters
4. The rest of the tables give top 20 imported commodities by each of 32 sub-sectors

Section II: Top 25 Imported Commodities, the Highest Importing Clusters and Total Value of Import

Table 1. Top 25 Commodities Imported vs. Importing Regional Clusters' Share in Each Commodity's Import (%, 2006)

Commodity Imported\Regional Clusters	11	12	13	22	32	41	53	54	55	56	61	72	81	91	92	101	111	131	132	151	Import Total (million $)
Motor vehicle parts manufacturing			98.65																		$3,488
Wholesale trade			39.80		9.05								5.16		6.81					6.62	$680
Management of companies and enterprises			26.17		8.47					4.62	6.64				15.31					5.26	$376
Iron and steel mills			53.20	8.13	18.40	9.11															$343
Petroleum refineries								35.42						5.56		24.67					$340
Semiconductors and related device manufacturing	11.07		60.95		5.63																$246
All other miscellaneous professional and technical			39.13		6.33												9.69				$235
Plastics material and resin manufacturing			13.19				28.03	4.97	34.11	11.44											$220
Petrochemical manufacturing								86.95													$167
Other engine equipment manufacturing		7.02	86.95		5.53																$153
Paper and paperboard mills							74.14														$145
AC- refrigeration- and forced air heating			20.98		75.00																$139
Real estate											15.61			5.28		20.72	27.62	7.43			$127
Audio and video equipment manufacturing			99.39																		$114
Other basic organic chemical manufacturing								24.63	25.78	17.58		6.87					6.37			5.36	$114
Lessors of nonfinancial intangible assets			61.43																	11.68	$109
Securities- commodity contracts- investments			27.92								4.59						6.00	35.04			$109
Copper rolling- drawing- and extruding			16.48		57.23								16.34								$106
Automotive repair and maintenance- except car wash			86.82																		$100
Architectural and engineering services			39.12								7.53					6.72	7.95		7.37		$91
Telecommunications			13.25		5.38						10.90					6.76	10.10		32.97		$89
Paperboard container manufacturing			10.80		9.28		7.12		4.84			13.48			19.02					14.48	$88
Synthetic rubber manufacturing										91.92											$85
Tire manufacturing			82.29							5.82											$84
Nondepository credit intermediation and related			28.72		4.53						12.06					6.27		13.65			$82

Section II: Top 25-50 Imported Commodities, the Highest Importing Clusters and Total Value of Import

Top 25-50 Commodities Imported vs. Regional Clusters' Import Share in Each Commodity's Import (%, 2006)

Commodity Imported\Regional Clusters	13	21	22	32	41	53	54	56	61	81	91	92	101	111	131	132	141	151	Import Total (million $)
Forest nurseries- forest products- and timber trac								33.02									66.06		$79
Legal services				8.10			5.38		13.06				9.51	27.52	10.06				$70
Management consulting services	15.67								24.27				9.41	17.07	6.54				$70
Ferrous metal foundaries	67.25		5.87	19.73															$69
Monetary authorities and depository credit interme	30.86			5.13					6.89			5.07	5.08		10.37				$68
Hotels and motels- including casino hotels	23.73			5.04			5.93		16.09			5.48	4.75	7.03	5.59				$66
Primary aluminum production	14.21									75.31									$65
Paint and coating manufacturing	71.47			5.51															$64
Motor and generator manufacturing				91.94															$60
Motor vehicle body manufacturing	99.91																		$59
Turned product and screw- nut- and bolt manufactur	77.26			11.22															$59
Other animal food manufacturing											98.54								$56
Air transportation	43.17			5.10					8.83			5.38		5.61					$54
Aluminum foundries	77.26			14.01															$54
Other rubber product manufacturing	46.71							40.05						4.51					$53
Insurance carriers	7.54						5.09		6.13				25.54	4.92	27.83				$53
Hardware manufacturing	77.62		11.01	4.59															$53
Aluminum sheet- plate- and foil manufacturing	34.76			30.07	7.73					18.84									$52
Logging																	99.90		$51
Rail transportation	31.76					4.66	5.39	5.04		8.68	5.08	7.39	6.32						$49
Warehousing and storage	36.67			4.94								9.98	10.88					4.60	$49
Data processing services	21.40			7.72					10.23			6.04		12.25	4.81	4.96			$48
Natural gas distribution	16.71	9.01					14.57			5.41		9.69	5.77	5.11					$47
Machine shops	44.73		10.29	15.85															$46
Advertising and related services	6.89			6.85					20.13				7.05	10.66	4.63	7.24		13.69	$45

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 3. Top 20 Commodities Imported by Cluster 11 (million $, 2006)

Commodities Imported	Computer and Electronic Equipment Cluster (11)
Semiconductors and related device manufacturing	$27.23
Wholesale trade	$7.91
All other electronic component manufacturing	$6.81
Management of companies and enterprises	$6.17
Broadcast and wireless communications equipment	$3.87
Business support services	$2.85
All other miscellaneous professional and technical	$2.41
Iron and steel mills	$2.15
Primary nonferrous metal- except copper and alumin	$1.61
Architectural and engineering services	$1.61
Electronic computer manufacturing	$1.55
Copper rolling- drawing- and extruding	$1.11
Plastics material and resin manufacturing	$1.03
Legal services	$0.96
All other forging and stamping	$0.94
Sheet metal work manufacturing	$0.87
Scientific research and development services	$0.84
Custom roll forming	$0.81
Electroplating- anodizing- and coloring metal	$0.74
Other basic organic chemical manufacturing	$0.72
Sub-total	**$72.20**
Cluster total	**$94.71**
Percent of Cluster Total	**76.24**

Table 4. Top 20 Commodities Imported by Cluster 12 (million $, 2006)

Commodities Imported	Construction Machinery and Distribution Equipment Cluster
Iron and steel mills	$11.86
Other engine equipment manufacturing	$10.77
Wholesale trade	$5.96
Motor vehicle parts manufacturing	$5.85
Management of companies and enterprises	$3.14
Speed changers and mechanical power transmission e	$2.76
Ferrous metal foundaries	$2.56
Metal valve manufacturing	$2.22
Tire manufacturing	$2.06
Fluid power pump and motor manufacturing	$1.99
All other miscellaneous professional and technical	$1.61
Fabricated structural metal manufacturing	$1.39
All other forging and stamping	$1.27
Fluid power cylinder and actuator manufacturing	$1.25
Rubber and plastics hose and belting manufacturing	$1.17
Petroleum refineries	$1.16
Sheet metal work manufacturing	$1.03
Construction machinery manufacturing	$1.01
Motor and generator manufacturing	$1.01
Semiconductors and related device manufacturing	$0.94
Sub total	**$72.97**
Cluster total	**$80.57**
Percent of Cluster Total	**90.57**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 5. Top 20 Commodities Imported by Cluster 13 (million $, 2006)

Commodities Imported	Motor Vehicles Cluster
Motor vehicle parts manufacturing	$3,441.25
Wholesale trade	$270.45
Iron and steel mills	$182.35
Semiconductors and related device manufacturing	$149.90
Other engine equipment manufacturing	$133.36
Audio and video equipment manufacturing	$113.14
Management of companies and enterprises	$98.37
All other miscellaneous professional and technical	$91.78
Automotive repair and maintenance- except car wash	$86.95
Tire manufacturing	$68.91
Lessors of nonfinancial intangible assets	$66.93
Motor vehicle body manufacturing	$58.91
Ferrous metal foundaries	$46.41
Paint and coating manufacturing	$45.91
Turned product and screw- nut- and bolt manufactur	$45.31
Aluminum foundries	$41.52
Hardware manufacturing	$40.91
Totalizing fluid meters and counting devices	$40.32
Architectural and engineering services	$35.79
Specialized design services	$31.93
Sub total	**$5,090.40**
Cluster total	**$6,031.14**
Percent of cluster total	**84.40**

Table 6. Top 20 Commodities Imported by Cluster 21 (million $, 2006)

Commodities Imported	Glass Products Cluster
Wholesale trade	$12.54
Management of companies and enterprises	$8.30
Glass and glass products- except glass containers	$7.36
Nonclay refractory manufacturing	$5.54
Other basic inorganic chemical manufacturing	$5.21
All other miscellaneous professional and technical	$4.24
Natural gas distribution	$4.23
Adhesive manufacturing	$3.73
Paperboard container manufacturing	$3.71
Sand- gravel- clay- and refractory mining	$3.61
Iron and steel mills	$3.55
Other basic organic chemical manufacturing	$2.62
Petroleum refineries	$2.61
Semiconductors and related device manufacturing	$2.52
Other miscellaneous chemical product manufacturing	$2.04
Coal mining	$1.56
Paint and coating manufacturing	$1.34
Gold- silver- and other metal ore mining	$1.08
Nondepository credit intermediation and related a	$1.03
Sub-total	**$76.80**
Cluster total	**$104.45**
Percent of cluster total	**73.53**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 7. Top 20 Commodities Imported by Cluster 22 (million $, 2006)

Commodities Imported	Machine Tools Cluster
Iron and steel mills	$27.86
Management of companies and enterprises	$12.21
Wholesale trade	$9.35
Hardware manufacturing	$5.80
Steel wire drawing	$5.63
All other miscellaneous professional and technical	$5.25
Machine shops	$4.76
Copper rolling- drawing- and extruding	$4.41
Ferrous metal foundaries	$4.05
Ball and roller bearing manufacturing	$3.48
Semiconductors and related device manufacturing	$2.99
Broadwoven fabric mills	$2.82
Paint and coating manufacturing	$2.50
Turned product and screw- nut- and bolt manufactur	$2.44
Aluminum foundries	$2.34
Aluminum sheet- plate- and foil manufacturing	$2.24
Iron and steel forging	$2.19
Other communication and energy wire manufacturing	$1.66
Securities- commodity contracts- investments	$1.64
Sub-total	**$103.61**
Cluster total	**$150.82**
Percent of cluster total	**68.70**

Table 8. Top 20 Commodities Imported by Cluster 31 (million $, 2006)

Commodities Imported	Concrete, Brick, Building Products Cluster
Cement manufacturing	$11.02
Sand- gravel- clay- and refractory mining	$4.91
Stone mining and quarrying	$3.90
Management of companies and enterprises	$2.42
Wholesale trade	$1.53
Ready-mix concrete manufacturing	$1.36
All other miscellaneous professional and technical	$1.09
Rail transportation	$0.82
Other basic inorganic chemical manufacturing	$0.82
Water transportation	$0.66
Natural gas distribution	$0.60
Semiconductors and related device manufacturing	$0.59
Steel wire drawing	$0.59
Paper and paperboard mills	$0.53
Fabricated structural metal manufacturing	$0.46
Gypsum product manufacturing	$0.44
Paint and coating manufacturing	$0.42
Petroleum refineries	$0.40
Sub-total	**$32.57**
Cluster total	**$42.03**
Percent of cluster total	**$77.49**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 9. Top 20 Commodities Imported by Cluster 32 (million $, 2006)

Row Labels	Nondurable Industry Machinery Cluster
AC- refrigeration- and forced air heating	$104.50
Iron and steel mills	$63.06
Wholesale trade	$61.48
Copper rolling- drawing- and extruding	$60.92
Motor and generator manufacturing	$55.07
Management of companies and enterprises	$31.83
Automatic environmental control manufacturing	$21.25
Aluminum sheet- plate- and foil manufacturing	$15.60
All other miscellaneous professional and technical	$14.84
Semiconductors and related device manufacturing	$13.84
Ferrous metal foundaries	$13.62
Relay and industrial control manufacturing	$12.17
All other forging and stamping	$10.89
Metal valve manufacturing	$10.41
Heating equipment- except warm air furnaces	$9.94
Other engine equipment manufacturing	$8.48
Paperboard container manufacturing	$8.21
Wiring device manufacturing	$7.55
Aluminum foundries	$7.53
Machine shops	$7.33
Sub-total	**$538.52**
Cluster total	**$751.40**
Percent of cluster total	**71.67**

Table 10. Top 20 Commodities Imported by Cluster 41 (million $, 2006)

Commodities Imported	Metalworking and Fabricated Metal Products Cluster
Iron and steel mills	$31.21
Wholesale trade	$6.65
Fabricated structural metal manufacturing	$6.50
Aluminum sheet- plate- and foil manufacturing	$4.01
Motor vehicle parts manufacturing	$3.75
Sheet metal work manufacturing	$3.59
Management of companies and enterprises	$3.34
Miscellaneous fabricated metal product manufacturi	$3.03
Copper rolling- drawing- and extruding	$2.96
Primary aluminum production	$2.81
All other miscellaneous professional and technical	$2.47
Paint and coating manufacturing	$1.91
Fabricated pipe and pipe fitting manufacturing	$1.44
Semiconductors and related device manufacturing	$1.43
Plate work manufacturing	$1.30
Other miscellaneous chemical product manufacturing	$1.17
Sub-total	**$77.55**
Cluster total	**$103.01**
Percent of cluster total	**75.28**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 11. Top 20 Commodities Imported by Cluster 51 (million $, 2006)

Commodities Imported	Chemical-Based Products Cluster
Petrochemical manufacturing	$5.81
Petroleum refineries	$4.96
Management of companies and enterprises	$4.15
All other petroleum and coal products manufacturing	$3.96
Wholesale trade	$2.86
Other basic organic chemical manufacturing	$2.34
Other basic inorganic chemical manufacturing	$1.99
Nitrogenous fertilizer manufacturing	$1.87
Miscellaneous nonmetallic mineral products	$1.60
Lessors of nonfinancial intangible assets	$1.59
All other miscellaneous professional and technical	$1.28
Architectural and engineering services	$1.19
Oil and gas extraction	$1.05
Ground or treated minerals and earths manufacturing	$0.92
Industrial process variable instruments	$0.82
Natural gas distribution	$0.68
Plastics pipe- fittings- and profile shapes	$0.65
Scientific research and development services	$0.64
Gold- silver- and other metal ore mining	$0.61
Power generation and supply	$0.61
Sub-total	**$39.57**
Cluster total	**$51.81**
Percent of cluster total	**76.38**

Table 12. Top 20 Commodities Imported by Cluster 52 (million $, 2006)

Commodities Imported	Mining Cluster
Petroleum refineries	$6.15
Construction machinery manufacturing	$1.61
Railroad rolling stock manufacturing	$1.31
Stone mining and quarrying	$1.29
Management of companies and enterprises	$1.12
Conveyor and conveying equipment manufacturing	$0.96
Scenic and sightseeing transportation and support	$0.82
Wholesale trade	$0.73
Machinery and equipment rental and leasing	$0.59
Motor vehicle parts manufacturing	$0.59
Pump and pumping equipment manufacturing	$0.41
Securities- commodity contracts- investments	$0.38
Other communications equipment manufacturing	$0.36
Independent artists- writers- and performers	$0.33
Support activities for other mining	$0.30
Management consulting services	$0.29
Other computer related services- including facilit	$0.27
Lessors of nonfinancial intangible assets	$0.26
Oil and gas extraction	$0.24
Fabricated structural metal manufacturing	$0.24
Sub-total	**$18.26**
Cluster total	**$23.50**
Percent of cluster total	**77.70**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 13. Top 20 Commodities Imported by Cluster 53 (million $, 2006)

Commodities Imported	Paper Cluster
Paper and paperboard mills	$107.52
Plastics material and resin manufacturing	$61.65
Management of companies and enterprises	$15.44
Wholesale trade	$13.00
Paperboard container manufacturing	$6.30
Printing ink manufacturing	$5.67
All other miscellaneous professional and technical	$5.27
Petroleum refineries	$4.64
Adhesive manufacturing	$3.65
Plastics pipe- fittings- and profile shapes	$3.58
Semiconductors and related device manufacturing	$3.06
Other basic organic chemical manufacturing	$2.71
Rail transportation	$2.28
Nondepository credit intermediation and related a	$1.31
Monetary authorities and depository credit interme	$1.24
Securities- commodity contracts- investments	$1.20
Real estate	$1.19
Pulp mills	$1.16
Hotels and motels- including casino hotels	$1.16
Laminated plastics plate- sheet- and shapes	$1.10
Sub-total	**$243.12**
Cluster total	**$272.70**
Percent of cluster total	**89.15**

Table 14. Top 20 Commodities Imported by Cluster 54 (million $, 2006)

Commodities Imported	Petroleum and Gas Cluster
Petrochemical manufacturing	$145.01
Petroleum refineries	$120.31
Waste management and remediation services	$29.13
Other basic organic chemical manufacturing	$28.02
Oil and gas extraction	$25.74
Wholesale trade	$15.13
Plastics material and resin manufacturing	$10.94
Motor vehicle parts manufacturing	$10.73
Commercial machinery repair and maintenance	$9.20
Coal mining	$7.01
Natural gas distribution	$6.83
Management of companies and enterprises	$6.42
Pipeline transportation	$5.91
Lessors of nonfinancial intangible assets	$4.31
Automotive repair and maintenance- except car wash	$3.94
Hotels and motels- including casino hotels	$3.92
All other miscellaneous professional and technical	$3.80
Legal services	$3.79
Telecommunications	$3.48
Insurance carriers	$2.69
Sub-total	**$446.31**
Cluster total	**$518.95**
Percent of cluster total	**86.00**

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Table 15. Top 20 Commodities Imported by Cluster 55 (million $, 2006)

Commodities Imported	Plastics Products Cluster
Plastics material and resin manufacturing	$75.00
Other basic organic chemical manufacturing	$29.32
Wholesale trade	$14.90
Petroleum refineries	$10.52
Management of companies and enterprises	$9.72
Petrochemical manufacturing	$6.01
All other miscellaneous professional and technical	$5.41
Pesticide and other agricultural chemical manufact	$4.71
Plastics pipe- fittings- and profile shapes	$4.31
Paperboard container manufacturing	$4.28
Semiconductors and related device manufacturing	$3.54
Wet corn milling	$3.49
Synthetic dye and pigment manufacturing	$3.01
Plastics and rubber industry machinery	$2.75
Relay and industrial control manufacturing	$2.16
Other basic inorganic chemical manufacturing	$1.83
Architectural and engineering services	$1.78
Synthetic rubber manufacturing	$1.74
Paper and paperboard mills	$1.70
Rail transportation	$1.66
Sub-total	**$187.84**
Cluster total	**$233.58**
Percent of cluster total	**80.42**

Table 16. Top 20 Commodities Imported by Cluster 56 (million $, 2006)

Commodities Imported	Rubber Products Cluster
Synthetic rubber manufacturing	$78.58
Tire cord and tire fabric mills	$29.83
Forest nurseries- forest products- and timber trac	$26.19
Plastics material and resin manufacturing	$25.16
Other rubber product manufacturing	$21.18
Other basic organic chemical manufacturing	$19.99
Wholesale trade	$18.57
Management of companies and enterprises	$17.38
Iron and steel mills	$10.21
Steel wire drawing	$9.71
All other miscellaneous professional and technical	$8.97
Other basic inorganic chemical manufacturing	$7.06
Miscellaneous fabricated metal product manufacturi	$6.99
Semiconductors and related device manufacturing	$5.29
Tire manufacturing	$4.87
Petroleum refineries	$4.85
Cellulosic organic fiber manufacturing	$4.57
Paperboard container manufacturing	$4.11
Textile and fabric finishing mills	$3.43
Architectural and engineering services	$3.29
Sub-total	**$310.23**
Cluster total	**$390.65**
Percent of cluster total	**79.41**

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Table 17. Top 20 Commodities Imported by Cluster 61 (million $, 2006)

Commodities Imported	Business Services Cluster
Management of companies and enterprises	$24.96
Real estate	$19.90
Management consulting services	$16.90
Wholesale trade	$13.77
Hotels and motels- including casino hotels	$10.63
Nondepository credit intermediation and related a	$9.85
Telecommunications	$9.75
Legal services	$9.20
Advertising and related services	$9.14
Petroleum refineries	$8.50
Office administrative services	$7.89
Environmental and other technical consulting service	$7.15
Architectural and engineering services	$6.88
Semiconductors and related device manufacturing	$6.78
All other miscellaneous professional and technical	$6.42
Business support services	$6.42
Employment services	$6.24
Accounting and bookkeeping services	$5.51
Securities- commodity contracts- investments	$5.00
Data processing services	$4.91
Sub-total	**$195.77**
Cluster total	**$310.28**
Percent of cluster total	**63.09**

Table 18. Top 20 Commodities Imported by Cluster 71 (million $, 2006)

Commodities Imported	Leather Products Cluster
Leather and hide tanning and finishing	$4.80
Polish and other sanitation good manufacturing	$3.35
Wholesale trade	$2.89
Management of companies and enterprises	$1.99
Other leather product manufacturing	$1.71
Broadwoven fabric mills	$1.70
Plastics material and resin manufacturing	$1.55
All other miscellaneous professional and technical	$1.16
Fiber- yarn- and thread mills	$1.12
Animal- except poultry- slaughtering	$0.92
Other basic inorganic chemical manufacturing	$0.63
Narrow fabric mills and schiffli embroidery	$0.58
Noncellulosic organic fiber manufacturing	$0.52
Semiconductors and related device manufacturing	$0.47
Surface active agent manufacturing	$0.45
Other miscellaneous textile product mills	$0.41
Lessors of nonfinancial intangible assets	$0.40
Natural gas distribution	$0.32
Monetary authorities and depository credit interme	$0.30
Cut and sew apparel manufacturing	$0.30
Sub-total	**$25.59**
Cluster total	**$32.52**
Percent of cluster total	**78.69**

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Table 19. Top 20 Commodities Imported by Cluster 72 (million $, 2006)

Commodities Imported	Optical Equipment and Instruments
Wholesale trade	$19.06
Paperboard container manufacturing	$11.92
Management of companies and enterprises	$10.14
Office supplies- except paper- manufacturing	$9.25
Other basic organic chemical manufacturing	$7.81
Synthetic dye and pigment manufacturing	$6.26
All other miscellaneous professional and technical	$6.08
Plastics pipe- fittings- and profile shapes	$4.74
Paper and paperboard mills	$4.67
Semiconductors and related device manufacturing	$3.61
Ground or treated minerals and earths manufacturing	$3.35
Other nonmetallic mineral mining	$2.31
Miscellaneous fabricated metal product manufacturi	$2.08
Sawmills	$2.06
Iron and steel mills	$1.86
Securities- commodity contracts- investments	$1.73
Advertising and related services	$1.70
Legal services	$1.59
Real estate	$1.44
Laminated plastics plate- sheet- and shapes	$1.33
Sub-total	**$103.00**
Cluster total	**$146.05**
Percent of cluster total	**70.52**

Table 20. Top 20 Commodities Imported by Cluster 73 (million $, 2006)

Commodities Imported	Textiles and Apparel Cluster
Broadwoven fabric mills	$18.47
Noncellulosic organic fiber manufacturing	$17.07
Fiber- yarn- and thread mills	$13.32
Wholesale trade	$10.23
Management of companies and enterprises	$5.78
Spring and wire product manufacturing	$5.61
Textile and fabric finishing mills	$5.13
Synthetic dye and pigment manufacturing	$4.55
Knit fabric mills	$4.48
All other miscellaneous professional and technical	$3.86
Cut and sew apparel manufacturing	$3.20
Cellulosic organic fiber manufacturing	$2.26
Other support services	$2.22
Narrow fabric mills and schiffli embroidery	$2.15
Semiconductors and related device manufacturing	$2.10
Other miscellaneous textile product mills	$1.95
Natural gas distribution	$1.50
Buttons- pins- and all other miscellaneous manufac	$1.27
Carpet and rug mills	$1.07
Petroleum refineries	$1.04
Sub-total	**$107.26**
Cluster total	**$130.25**
Percent of cluster total	**82.35**

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Table 21. Top 20 Commodities Imported by Cluster 74 (million $, 2006)

Commodities Imported	Wood Product and Furniture
Iron and steel mills	$1.12
Wholesale trade	$0.75
Reconstituted wood product manufacturing	$0.37
Management of companies and enterprises	$0.27
Paperboard container manufacturing	$0.26
All other miscellaneous professional and technical	$0.21
Paint and coating manufacturing	$0.19
Plastics plumbing fixtures and all other plastics	$0.17
Hardware manufacturing	$0.16
Aluminum sheet- plate- and foil manufacturing	$0.16
Sheet metal work manufacturing	$0.15
Laminated plastics plate- sheet- and shapes	$0.15
All other forging and stamping	$0.13
Veneer and plywood manufacturing	$0.13
Semiconductors and related device manufacturing	$0.12
Textile and fabric finishing mills	$0.11
Fabric coating mills	$0.09
Sub-total	**$4.54**
Cluster total	**$6.32**
Percent of cluster total	**71.84**

Table 22. Top 20 Commodities Imported by Cluster 81 (million $, 2006)

Commodities Imported	Aluminum and Copper products
Primary aluminum production	$48.93
Wholesale trade	$35.06
Primary smelting and refining of copper	$23.20
Copper rolling- drawing- and extruding	$17.39
Primary nonferrous metal- except copper and alumin	$10.30
Aluminum sheet- plate- and foil manufacturing	$9.77
Management of companies and enterprises	$6.90
All other miscellaneous professional and technical	$5.48
Rail transportation	$4.25
Iron and steel mills	$4.20
Gold- silver- and other metal ore mining	$3.82
Petroleum refineries	$3.40
Industrial pattern manufacturing	$3.20
Semiconductors and related device manufacturing	$2.79
Natural gas distribution	$2.53
Ferroalloy and related product manufacturing	$2.44
Scrap	$1.96
Nonferrous metal- except copper and aluminum- shap	$1.76
Coal mining	$1.54
Securities- commodity contracts- investments	$1.44
Sub-total	**$190.36**
Cluster total	**$229.67**
Percent of cluster total	**82.88**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 23. Top 20 Commodities Imported by Cluster 91 (million $, 2006)

Commodities Imported	Feed Products Cluster
Other animal food manufacturing	$54.73
Petroleum refineries	$18.90
Soybean processing	$13.04
Wholesale trade	$9.04
Grain farming	$6.74
Real estate	$6.73
Agriculture and forestry support activities	$5.69
Pesticide and other agricultural chemical manufact	$5.59
Pharmaceutical and medicine manufacturing	$2.60
Rail transportation	$2.49
Other oilseed processing	$1.87
Warehousing and storage	$1.68
All other crop farming	$1.47
Nitrogenous fertilizer manufacturing	$1.43
Farm machinery and equipment manufacturing	$1.29
Insurance carriers	$1.24
Flour milling	$1.17
Industrial truck- trailer- and stacker manufacturi	$1.04
Monetary authorities and depository credit interme	$0.99
Cattle ranching and farming	$0.92
Sub-total	**$138.65**
Cluster total	**$158.51**
Percent of cluster total	**87.47**

Table 24. Top 20 Commodities Imported by Cluster 92 (million $, 2006)

Commodities Imported	Packaged Food Products
Management of companies and enterprises	$57.55
Wholesale trade	$46.28
Poultry and egg production	$17.29
Paperboard container manufacturing	$16.82
Fats and oils refining and blending	$10.50
Grain farming	$9.17
All other miscellaneous professional and technical	$8.85
Plastics pipe- fittings- and profile shapes	$8.77
Flour milling	$8.75
Petroleum refineries	$7.12
Coated and laminated paper and packaging materials	$6.98
Metal can- box- and other container manufacturing	$5.09
Warehousing and storage	$4.88
Natural gas distribution	$4.54
Animal production- except cattle and poultry and e	$4.05
Vegetable and melon farming	$3.95
Hotels and motels- including casino hotels	$3.62
Rail transportation	$3.62
Nondepository credit intermediation and related a	$3.61
Monetary authorities and depository credit interme	$3.46
Sub-total	**$234.92**
Cluster total	**$299.19**
Percent of cluster total	**78.52**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 25. Top 20 Commodities Imported by Cluster 101 (million $, 2006)

Commodities Imported	Hotels and Transportation Services
Petroleum refineries	$83.81
Real estate	$26.41
Motor vehicle parts manufacturing	$14.18
Wholesale trade	$13.95
Insurance carriers	$13.50
Management of companies and enterprises	$9.58
Scenic and sightseeing transportation and support	$8.50
Office administrative services	$6.93
Legal services	$6.70
Management consulting services	$6.55
Architectural and engineering services	$6.15
Services to buildings and dwellings	$6.08
Telecommunications	$6.04
Travel arrangement and reservation services	$5.75
Warehousing and storage	$5.32
Automotive equipment rental and leasing	$5.17
Nondepository credit intermediation and related a	$5.12
Monetary authorities and depository credit interme	$3.47
Tire manufacturing	$3.46
Advertising and related services	$3.20
Sub-total	**$239.89**
Cluster total	**$329.97**
Percent of cluster total	**72.70**

Table 26. Top 20 Commodities Imported by Cluster 111 (million $, 2006)

Commodities Imported	Management, Higher Education and Hospitals
Real estate	$35.20
All other miscellaneous professional and technical	$22.74
Legal services	$19.38
Office administrative services	$12.25
Management consulting services	$11.89
Wholesale trade	$11.29
Pharmaceutical and medicine manufacturing	$10.31
Employment services	$9.23
Telecommunications	$9.03
Commercial printing	$8.08
Dog and cat food manufacturing	$7.88
Guided missile and space vehicle manufacturing	$7.75
Architectural and engineering services	$7.28
Other basic organic chemical manufacturing	$7.25
Securities- commodity contracts- investments	$6.53
Polish and other sanitation good manufacturing	$6.34
Business support services	$6.07
Glass and glass products- except glass containers	$6.01
Data processing services	$5.87
Accounting and bookkeeping services	$5.29
Sub-total	**$215.65**
Cluster total	**$378.49**
Percent of cluster total	**56.98**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 27. Top 20 Commodities Imported by Cluster 112 (million $, 2006)

Commodities Imported	Construction
Wholesale trade	$5.62
Petroleum refineries	$5.48
Plastics material and resin manufacturing	$5.14
Architectural and engineering services	$3.97
AC- refrigeration- and forced air heating	$3.66
Metal window and door manufacturing	$2.98
Ready-mix concrete manufacturing	$2.73
Gypsum product manufacturing	$2.70
Wood windows and door manufacturing	$2.67
Motor vehicle parts manufacturing	$2.63
Reconstituted wood product manufacturing	$2.31
Synthetic dye and pigment manufacturing	$1.86
Sawmills	$1.82
Wood kitchen cabinet and countertop manufacturing	$1.80
Management of companies and enterprises	$1.80
Carpet and rug mills	$1.79
Petrochemical manufacturing	$1.65
Paint and coating manufacturing	$1.54
Plastics pipe- fittings- and profile shapes	$1.39
Household refrigerator and home freezer manufactur	$1.38
Sub-total	**$54.94**
Cluster total	**$105.96**
Percent of cluster total	**51.85**

Table 28. Top 20 Commodities Imported by Cluster 121 (million $, 2006)

Commodities Imported	Arts and Media
Motion picture and video industries	$8.11
Spectator sports	$4.54
Radio and television broadcasting	$2.92
All other miscellaneous professional and technical	$1.09
Independent artists- writers- and performers	$0.93
Telecommunications	$0.74
Promoters of performing arts and sports and agents	$0.69
Lessors of nonfinancial intangible assets	$0.68
Advertising and related services	$0.64
Information services	$0.47
Real estate	$0.43
Audio and video media reproduction	$0.28
Sound recording industries	$0.27
Management of companies and enterprises	$0.25
Nondepository credit intermediation and related a	$0.19
Legal services	$0.16
Securities- commodity contracts- investments	$0.15
Management consulting services	$0.14
Monetary authorities and depository credit interme	$0.14
Accounting and bookkeeping services	$0.13
Sub-total	**$22.96**
Cluster total	**$25.41**
Percent of cluster total	**90.36**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 29. Top 20 Commodities Imported by Cluster 131 (million $, 2006)

Commodities Imported	Financial Services and Insurance
Securities- commodity contracts- investments	$38.14
Insurance agencies- brokerages- and related	$35.88
Insurance carriers	$14.70
Nondepository credit intermediation and related a	$11.15
Real estate	$9.47
Accounting and bookkeeping services	$7.56
Monetary authorities and depository credit interme	$7.08
Legal services	$7.08
Petroleum refineries	$6.34
All other miscellaneous professional and technical	$4.89
Management consulting services	$4.56
Management of companies and enterprises	$3.69
Hotels and motels- including casino hotels	$3.69
Automotive equipment rental and leasing	$3.58
Business support services	$3.14
Telecommunications	$2.88
Data processing services	$2.30
Advertising and related services	$2.10
Funds- trusts- and other financial vehicles	$2.08
Air transportation	$1.76
Sub-total	**$172.10**
Cluster total	**$198.17**
Percent of cluster total	**86.84**

Table 30. Top 20 Commodities Imported by Cluster 132 (million $, 2006)

Commodities Imported	Information Services
Telecommunications	$29.48
Architectural and engineering services	$6.74
Semiconductors and related device manufacturing	$5.24
All other miscellaneous professional and technical	$4.08
Noncomparable imports	$3.79
Accounting and bookkeeping services	$3.49
Advertising and related services	$3.28
Other computer peripheral equipment manufacturing	$2.99
Real estate	$2.98
Wholesale trade	$2.53
Data processing services	$2.38
Office administrative services	$2.12
Employment services	$1.85
Telephone apparatus manufacturing	$1.56
Legal services	$1.54
Management of companies and enterprises	$1.51
Information services	$1.44
Computer storage device manufacturing	$1.43
Management consulting services	$1.43
Specialized design services	$1.29
Sub-total	**$81.17**
Cluster total	**$116.50**
Percent of cluster total	**69.67**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 31. Top 20 Commodities Imported by Cluster 141 (million $, 2006)

Commodities Imported	Wood Building Products and Processing
Forest nurseries- forest products- and timber trac	$52.42
Logging	$50.65
Sawmills	$25.00
Wholesale trade	$15.94
All other miscellaneous professional and technical	$4.91
Petroleum refineries	$4.73
Management of companies and enterprises	$4.32
Reconstituted wood product manufacturing	$3.74
Miscellaneous wood product manufacturing	$3.69
Semiconductors and related device manufacturing	$2.71
Rail transportation	$2.06
Agriculture and forestry support activities	$1.76
Hardware manufacturing	$1.48
Paperboard container manufacturing	$1.46
Paint and coating manufacturing	$1.45
Nondepository credit intermediation and related a	$1.43
Veneer and plywood manufacturing	$1.43
Natural gas distribution	$1.38
Monetary authorities and depository credit interme	$1.35
Plastics material and resin manufacturing	$1.32
Sub-total	**$183.22**
Cluster total	**$208.42**
Percent of cluster total	**87.91**

Table 32. Top 20 Commodities Imported by Cluster 151 (million $, 2006)

Commodities Imported	Breweries and Distilleries
Wholesale trade	$44.97
Distilleries	$39.11
Plastics bottle manufacturing	$20.51
Management of companies and enterprises	$19.78
Glass container manufacturing	$19.37
Paperboard container manufacturing	$12.81
Lessors of nonfinancial intangible assets	$12.72
Metal can- box- and other container manufacturing	$12.45
Petroleum refineries	$9.82
All other miscellaneous professional and technical	$9.74
Flavoring syrup and concentrate manufacturing	$7.58
Toilet preparation manufacturing	$6.37
Advertising and related services	$6.21
Other basic organic chemical manufacturing	$6.10
Surface active agent manufacturing	$4.70
Other miscellaneous chemical product manufacturing	$4.42
Semiconductors and related device manufacturing	$3.88
Wet corn milling	$3.19
Noncomparable imports	$2.95
Plastics plumbing fixtures and all other plastics	$2.82
Sub-total	**$249.49**
Cluster total	**$318.14**
Percent of cluster total	**78.42**

Section III: Top 20 Commodity Imports by the Regional Clusters

Table 33. Top 20 Commodities Imported by Cluster 161 (million $, 2006)

Commodities Imported	Printing and Publishing
Paper and paperboard mills	$16.42
Information services	$5.63
Wholesale trade	$4.02
Printing ink manufacturing	$3.86
All other miscellaneous professional and technical	$3.12
Management of companies and enterprises	$3.08
Commercial printing	$2.39
Lessors of nonfinancial intangible assets	$2.12
Periodical publishers	$1.95
Books printing	$1.87
Prepress services	$1.33
Book publishers	$1.13
Coated and laminated paper and packaging materials	$1.09
Petroleum refineries	$1.03
Database- directory- and other publishers	$1.00
Real estate	$0.97
Legal services	$0.76
Printing machinery and equipment manufacturing	$0.73
Advertising and related services	$0.70
Telecommunications	$0.65
Sub-total	**$53.54**
Cluster total	**$69.25**
Percent of cluster total	**77.31**

Table 34. Top 20 Commodities Imported by Cluster 171 (million $, 2006)

Commodities Imported	Farming
Petroleum refineries	$9.68
Pesticide and other agricultural chemical manufact	$8.28
Nitrogenous fertilizer manufacturing	$5.40
Real estate	$3.43
Agriculture and forestry support activities	$2.89
Phosphatic fertilizer manufacturing	$2.25
Wholesale trade	$2.10
Insurance carriers	$0.82
Warehousing and storage	$0.55
Farm machinery and equipment manufacturing	$0.48
Greenhouse and nursery production	$0.47
Steel wire drawing	$0.38
Industrial truck- trailer- and stacker manufacturi	$0.36
Monetary authorities and depository credit interme	$0.34
Other basic inorganic chemical manufacturing	$0.29
Grain farming	$0.29
Motor vehicle parts manufacturing	$0.27
Tire manufacturing	$0.23
Power generation and supply	$0.23
Plastics plumbing fixtures and all other plastics	$0.19
Sub-total	**$38.93**
Cluster total	**$42.40**
Percent of cluster total	**91.82**

Thank You!

Questions?

Linkages between Regional Clusters and National Technology Clusters

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Section I: National Technology Clusters

1. Nationally, 15 technology clusters are identified (Feser, 2005)
2. We match sectors under these technology clusters with those sectors we identified under the regional sub-clusters
3. Numeric codes in columns in the following tables represent regional clusters
4. The number (1) in the cells indicates that that technology sector is currently present in the region and part of a given regional industry cluster
5. For example, in Table 1, under "Aerospace," a technology cluster, the "other aircraft parts and equipment" sector has regional presence and associated with the regional cluster "13," that is "Motor Vehicle."

Section II: How to read these tables and what to make out of them

- These tables
  - give us a sense of what technology sectors the region currently has and how these regional technology sectors are related to the regional industry clusters
  - guide us in selecting target clusters by providing an answer to the question of "what technology clusters and sectors are missing in the regional economy?"
  - finally, help us see the connections between various national technology clusters and regional clusters that may be useful in the final evaluation of target industries

Section III: National Technology Clusters and Regional Linkages: Aerospace and Architectural and Engineering Services

Table 1. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Aerospace															
Aircraft engine and engine parts manufacturing															**Yes**
Aircraft manufacturing															**Yes**
Guided missile and space vehicle manufacturing															**Yes**
Other aircraft parts and equipment			1												No
Propulsion units and parts for space vehicles and guided missiles															**Yes**
Technology Cluster: Architectural & Engineering Services															
Architectural and engineering services									1						No
Custom computer programming services													1		No
Environmental and other technical consulting services									1						No
Information services													1		No
Management consulting services									1						No
Other communications equipment manufacturing															**Yes**
Scientific research and development services											1				No
Specialized design services									1						No

Section III: National Technology Clusters and Regional Linkages: Cable Manufacturing and Chemicals

Table 2. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Cable Manufacturing															
Fiber optic cable manufacturing															**Yes**
Other communication and energy wire manufacturing															**Yes**
Paint and coating manufacturing												1			No
Switchgear and switchboard apparatus manufacturing															**Yes**
Wiring device manufacturing												1			No
Technology Cluster: Chemicals															
Adhesive manufacturing								1							No
Cellulosic organic fiber manufacturing															**Yes**
Custom compounding of purchased resins								1							No
Nitrogenous fertilizer manufacturing															**Yes**
Noncellulosic organic fiber manufacturing															**Yes**
Other basic organic chemical manufacturing						1									No
Other miscellaneous chemical product manufacturing															**Yes**
Pesticide and other agricultural chemical manufacturing								1							No
Petrochemical manufacturing															**Yes**
Plastics material and resin manufacturing							1								No
Printing ink manufacturing															**Yes**
Surface active agent manufacturing															**Yes**
Synthetic rubber manufacturing															**Yes**

Section III: National Technology Clusters and Regional Linkages: Computer and Electronic Equipment

Table 3. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Computer & Electronic Equipment															
All other electronic component manufacturing	1														No
Broadcast and wireless communications equipment	1														No
Computer storage device manufacturing															**Yes**
Computer terminal manufacturing															**Yes**
Electricity and signal testing instruments															**Yes**
Electromedical apparatus manufacturing															**Yes**
Electron tube manufacturing															**Yes**
Electronic computer manufacturing															**Yes**
Irradiation apparatus manufacturing	1														No
Other computer peripheral equipment manufacturing															**Yes**
Search, detection, and navigation instruments															**Yes**
Semiconductors and related device manufacturing															**Yes**
Telephone apparatus manufacturing															**Yes**

Section III: National Technology Clusters and Regional Linkages: Engine Equipment

Table 4. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Engine Equipment															
Air and gas compressor manufacturing					1										No
Fluid power cylinder and actuator manufacturing															**Yes**
Fluid power pump and motor manufacturing															**Yes**
Measuring and dispensing pump manufacturing															**Yes**
Metal valve manufacturing				1											No
Military armored vehicles and tank parts manufacturing															**Yes**
Motor and generator manufacturing					1										No
Motor vehicle parts manufacturing			1												No
Other engine equipment manufacturing															**Yes**
Power-driven handtool manufacturing					1										No
Pump and pumping equipment manufacturing															**Yes**
Scales, balances, and miscellaneous general purpose machinery															**Yes**
Small arms manufacturing															**Yes**
Speed changers and mechanical power transmission equipment				1											No
Turbine and turbine generator set units manufacturing		1													No
Welding and soldering equipment manufacturing															**Yes**

Section III: National Technology Clusters and Regional Linkages: Fertilizer and Chemical Products and Industrial Machinery and Distribution Equipment

Table 5. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Fertilizer & Chemical Products															
Carbon and graphite product manufacturing						1									No
Explosives manufacturing						1									No
Fertilizer, mixing only, manufacturing															**Yes**
Industrial gas manufacturing															**Yes**
Nitrogenous fertilizer manufacturing															**Yes**
Other basic inorganic chemical manufacturing						1									No
Petrochemical manufacturing															**Yes**
Phosphatic fertilizer manufacturing															**Yes**
Synthetic dye and pigment manufacturing						1									No
Technology Cluster: Industrial Machinery & Distribution Equipment															
Construction machinery manufacturing		1													No
Conveyor and conveying equipment manufacturing															**Yes**
Electric power and specialty transformer manufacturing															**Yes**
Elevator and moving stairway manufacturing		1													No
Industrial process furnace and oven manufacturing															**Yes**
Industrial truck, trailer, and stacker manufacturing		1													No
Mining machinery and equipment manufacturing		1													No
Oil and gas field machinery and equipment															**Yes**
Overhead cranes, hoists, and monorail systems															**Yes**
Packaging machinery manufacturing															**Yes**
Railroad rolling stock manufacturing															**Yes**
Semiconductor machinery manufacturing															**Yes**

Section III: National Technology Clusters and Regional Linkages: Information Services and Medical Instruments and Optics

Table 6. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Information Services															
Cable networks and program distribution															**Yes**
Computer systems design services													1		No
Custom computer programming services													1		No
Data processing services													1		No
Information services													1		No
Other computer related services, including facilities management													1		No
Software publishers															**Yes**
Telecommunications													1		No
Technology Cluster: Medical Instruments and Optics															
Ammunition manufacturing															**Yes**
Audio and video equipment manufacturing															**Yes**
Dental equipment and supplies manufacturing															**Yes**
Miscellaneous electrical equipment manufacturing	1														No
Ophthalmic goods manufacturing															**Yes**
Other ordnance and accessories manufacturing															**Yes**
Photographic and photocopying equipment manufacturing															**Yes**
Photographic film and chemical manufacturing															**Yes**
Primary battery manufacturing															**Yes**
Storage battery manufacturing															**Yes**
Surgical and medical instrument manufacturing										1					No
Surgical appliance and supplies manufacturing										1					No

Section III: National Technology Clusters and Regional Linkages: Motor Vehicles, Pharmaceuticals and Precision Instruments

Table 7. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Motor Vehicles															
Audio and video equipment manufacturing															**Yes**
Automobile and light truck manufacturing			1												No
Heavy duty truck manufacturing															**Yes**
Motor vehicle parts manufacturing			1												No
Technology Cluster: Pharmaceuticals															
Pesticide and other agricultural chemical manufacturing								1							No
Pharmaceutical and medicine manufacturing											1				No
Polish and other sanitation good manufacturing															**Yes**
Soap and other detergent manufacturing															**Yes**
Toilet preparation manufacturing														1	No
Technology Cluster: Precision Instruments															
Analytical laboratory instrument manufacturing															**Yes**
Automatic environmental control manufacturing															**Yes**
Electricity and signal testing instruments															**Yes**
Industrial process variable instruments	1														No
Optical instrument and lens manufacturing															**Yes**
Relay and industrial control manufacturing					1										No
Totalizing fluid meters and counting devices															**Yes**
Watch, clock, and other measuring and controlling device manufacturing	1														No

Section III: National Technology Clusters and Regional Linkages: Technical and Research Services and Wiring Devices and Switches

Table 8. Regional Cluster Connections and Local Gaps in Technology Clusters

National Technology Cluster Template and Regional Cluster Connection	Regional Clusters														
National Technology Clusters: RED FONTS INDICATE LOCAL GAPS	11	12	13	22	32	51	54	55	61	72	111	112	132	151	Local Gaps? (Missing Sectors)
Technology Cluster: Technical & Research Services															
Architectural and engineering services									1						No
Custom computer programming services													1		No
Environmental and other technical consulting services									1						No
Information services													1		No
Management consulting services									1						No
Other ambulatory health care services											1				No
Scientific research and development services											1				No
Specialized design services									1						No
Technology Cluster: Wiring Devices & Switches															
Architectural and engineering services									1						No
Motor and generator manufacturing					1										No
Other communications equipment manufacturing															**Yes**
Switchgear and switchboard apparatus manufacturing															**Yes**
Wiring device manufacturing												1			No

Section III: National Technology Clusters and Regional Linkages: Different perspective on linkages across the clusters

Table 9. Regional Clusters vs. National Technology Clusters

Regional Cluster Name	Regional Clusters	Aerospace	Architectural & Engineering Services	Cable Manufacturing	Chemicals	Computer & Electronic Equipment	Engine Equipment	Fertilizer & Chemical Products	Industrial Machinery & Distribution Equipment	Information Services	Medical Instruments and Optics	Motor Vehicles	Pharmaceuticals	Precision Instruments	Technical & Research Services	Wiring Devices & Switches
Computer and Electronic Equipment	11					3					1			2		
Construction Machinery and Distribution Equipment	12						1		4							
Motor Vehicles	13	1					1					2				
Machine Tools	22						2									
Nondurable Industry Machinery	32						3							1		1
Chemical-Based Products	51				1			4								
Petroleum and Gas	54				1											
Plastics Products	55				3								1			
Business Services	61		4												4	1
Optical Equipment and Instruments	72										2					
Management, Higher Education and Hospitals	111		1										1		2	
Construction	112			2												1
Information Services	132		2							6					2	
Breweries and Distilleries	151												1			
Technology Industries not in the region	Missing	4	1	3	8	10	9	5	8	2	9	2	2	5		2

Thank You!

Questions?